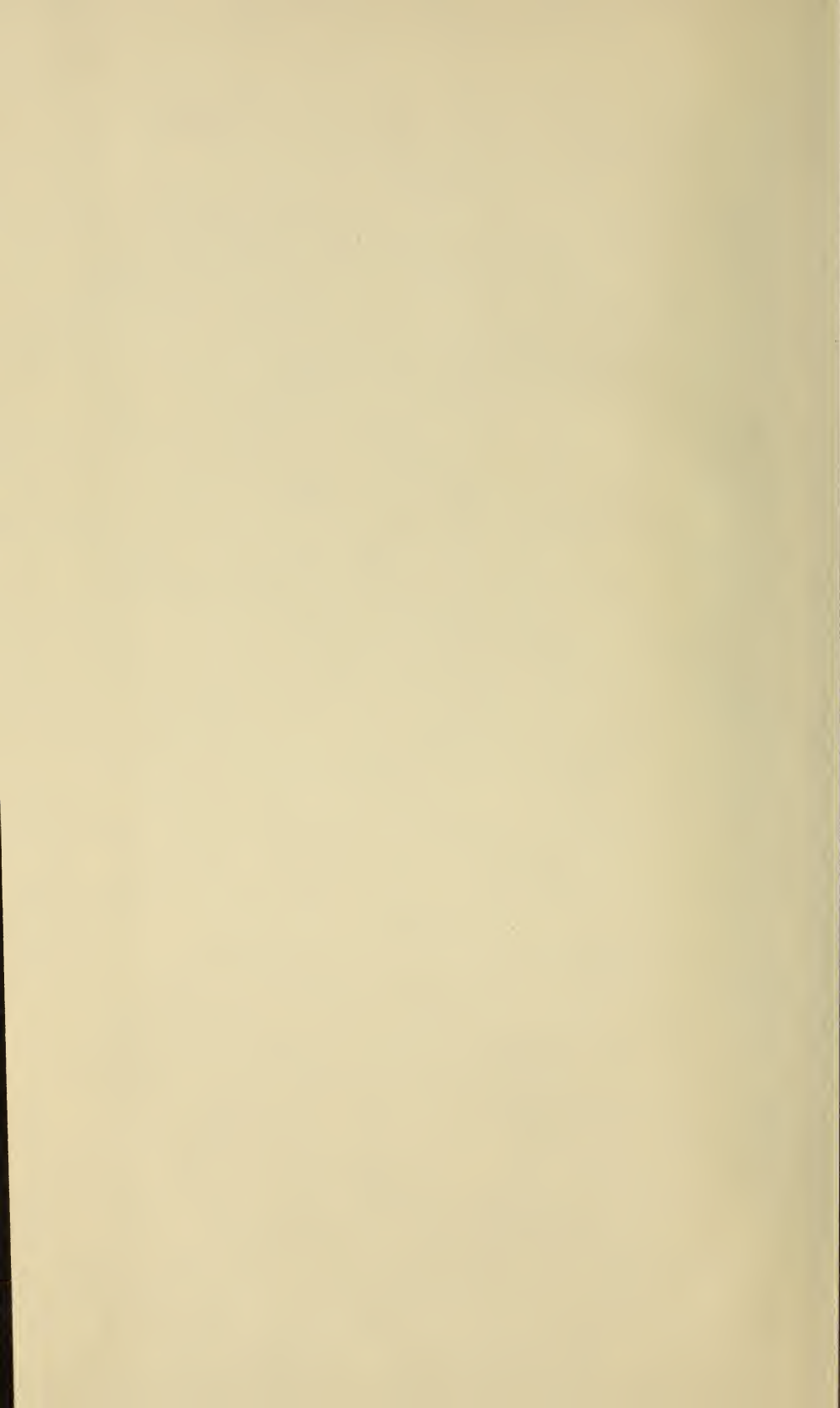




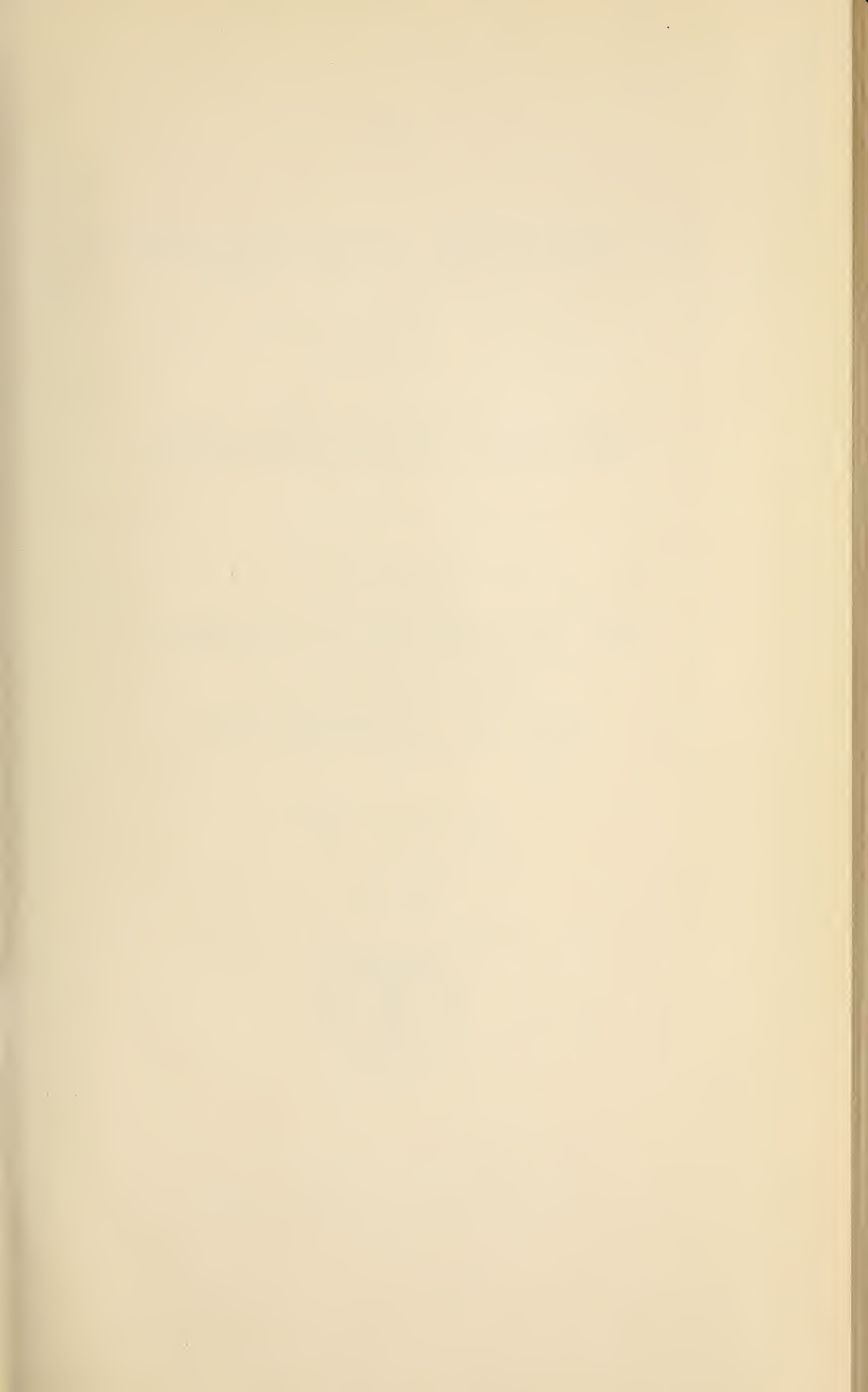


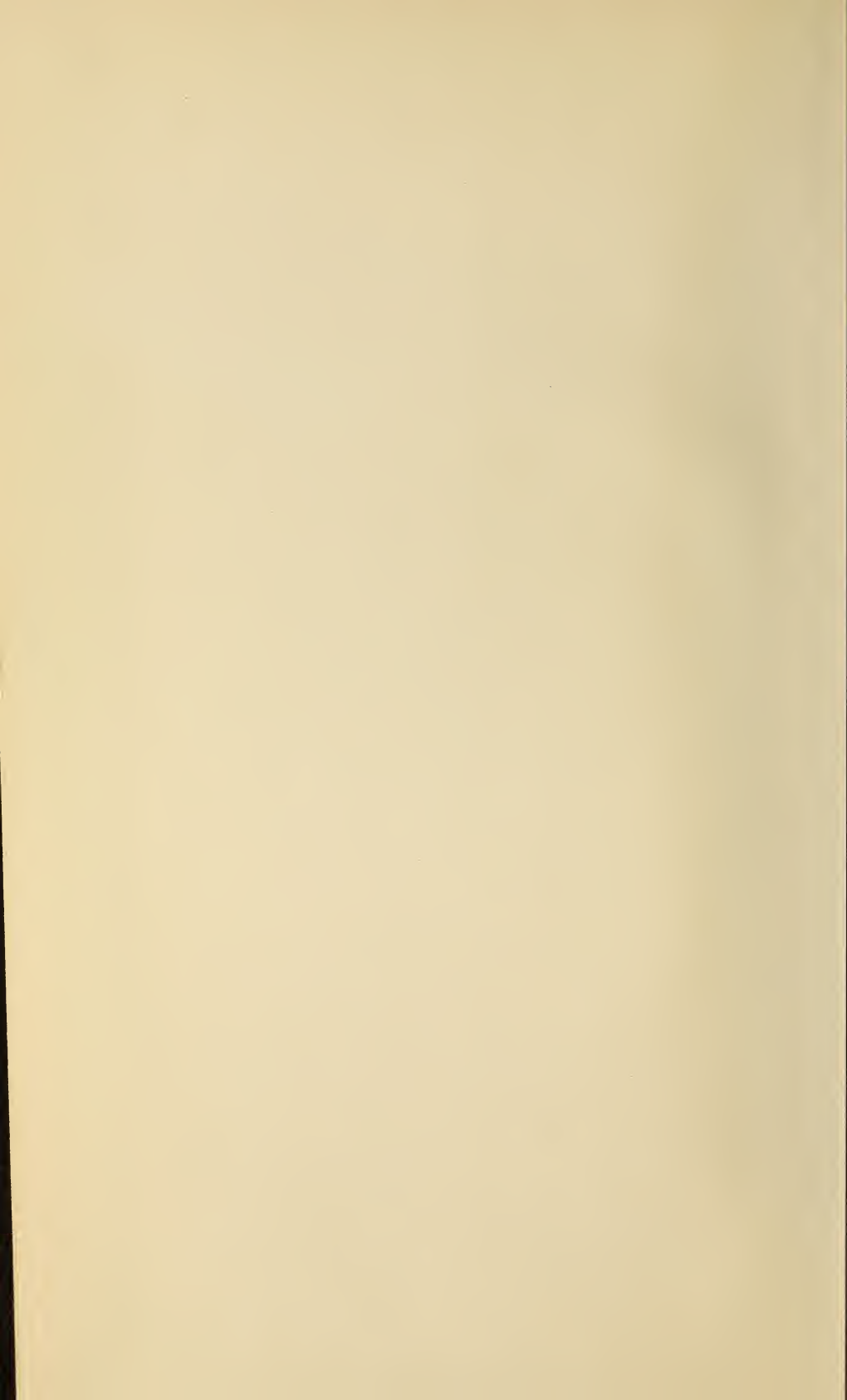














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EDITED BY  
EDWARD P. DAVIS, A.M., M.D.

WITH THE CO-OPERATION IN LONDON OF  
HECTOR MACKENZIE, M.A., M.D., F.R.C.P.

NEW SERIES.

VOL. CXI.



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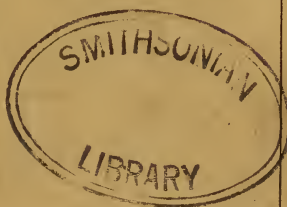
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TRICHOMONAS AS A PARASITE OF MAN.\*

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IN 1836 Donn <sup>1</sup> found a previously undescribed parasite in the vaginal secretions of women. These were described as roundish bodies about twice the size of pus corpuscles and difficult to distinguish from the latter except by their independent motion. The motion was produced by certain organs, viz., a flagelliform appendage at the anterior end which worked with great rapidity, and a row of short cilia, at one side and near the flagellum, which kept up a sort of rotary motion. At the posterior end was a tail-like appendage of variable shape (Fig. 18). On account of the fact that the parasite resembled monads in having a flagellum, and "trichodines" (ciliata) in having cilia, Donn  gave it the name of trichomonas, with the specific name *vaginale* on account of the habitat. Although there were errors in Donn 's description, it was remarkably good considering the methods of observation and the knowledge of micro-parasites then available. Certain details in the description will be mentioned later. Notwithstanding Donn 's growing reputation as a microscopist, and the fact that his observations were controlled by such men as Dujardin, Milne-Edwards, Ricord, and others,<sup>1</sup> many microscopists (Vogel, Siebold, Valentin) denied the parasitic nature of the bodies, and held them to be altered epithelial cells from the uterus. Later, however, Scanzoni and K lliker,<sup>2</sup> Hennig,<sup>3</sup> Haussmann,<sup>4</sup> and Gasser<sup>5</sup> re-examined the organisms, mostly from the side of clinical microscopy. Still later K nstler<sup>6</sup> and Henneguy, in France,<sup>7</sup> and Blochman,<sup>8</sup> working under B tschli, in Germany,<sup>9</sup> made

\* Read before the Pathological Society of Philadelphia, April 25, 1895.

investigations in the biology of the organisms, which, while differing in many respects, have added considerably to our knowledge. Within the last year Marchand<sup>10</sup> has examined the parasites with results to be mentioned later.

On the whole, the parasites have been deemed of so little importance that scant notice is given them. The descriptions in most text-books on gynecology, microscopy, and pathology are inadequate or erroneous, and the same is true even of some recent works on animal parasites.

An extensive but necessarily incomplete search of the American literature fails to reveal any reference to the occurrence of trichomonas vaginalis in this country. I have found it once only in the vaginal secretions of a pregnant woman in Galveston, Texas. Since my interest in the matter has been excited I have looked for it, but without success. This may be explained partly by the small number of persons examined, partly by the cleanliness of the subjects and the almost universal use of douches—the organisms being very sensitive to cold water.

Since the discovery of Donné, zoölogists have found parasites of the same kind, or closely related, in snails, frogs, ducks, etc.<sup>11, 12, 13, 14</sup> With the exception of Stein, however, none of these writers have influenced the study of the human parasite.

Flagellate organisms have been observed in stools since an early period. In many cases the organisms belonged to the kind first described by Davaine,<sup>15</sup> who found them in cholera and typhoid fever, and named by him *cercomonas hominis*. The efforts of some writers to deny the existence of these bodies, or to identify them with trichomonas, have not met with entire success. I<sup>16</sup> have encountered this same parasite in amoebic dysentery and typhoid fever and agree with Leuckart when he says that Davaine's observation, though one of the oldest, is still one of the best and most accurate. The same organisms have been found by Ekecrantz,<sup>17</sup> Tham,<sup>18</sup> Cunningham,<sup>19</sup> Grassi,<sup>20</sup> von Jaksch,<sup>21</sup> Müller,<sup>22</sup> Massiutin,<sup>23</sup> Kartulis,<sup>24</sup> Cahen,<sup>25</sup> Lutz,<sup>26</sup> Councilman and Laffeur,<sup>27</sup> Schuberger,<sup>28</sup> and others.\* This parasite has to be considered at many points in studying trichomonas, as we shall see. We must leave it now to take up the history of some intestinal flagellates more closely related to the latter.

In 1875 Marchand<sup>31</sup> found large numbers of infusoria in the evacuations of a case of typhoid fever. He thought they might have been the same as those of Davaine and Lambl, but they had cilia, which the earlier observers did not mention, but had no flagellum as had Davaine's organism. The flagellum, however, Marchand thought might be extremely hard to see.

\* The parasites found by Lambl<sup>29</sup> in the stools of children, and often spoken of as cercomonads, were really of a different genus, *Megastoma* or *Lamblia*. (Cf. Braun, 49, p. 111.) Lambl's *cercomonas* from the liver<sup>30</sup> cannot be definitely placed; at all events it does not require further consideration now.

Soon after Zunker,<sup>32</sup> in the course of systematic examinations of stools, found parasites like those of Davaine in two cases and in seven others another form, which he thought similar to that found by Marchand. The description and the figures in this report differ from those of Marchand, and yet any one familiar with such organisms will admit that it is possible both Marchand and Zunker found the same organism. Based on these two reports, the accuracy of which he doubted in some particulars, Leuckart erected the species *trichomonas intestinalis*, which has since been accepted by some others.<sup>33</sup>

Grassi (*loc. cit.*) found parasites which he considered identical with *cercomonas* Davaine and *trichomonas intestinalis* Leuckart, and placed these together in a genus named by him *monocercomonas*. It is almost certain that some of Grassi's organisms belong to *trichomonas intestinalis* Leuckart, and differ considerably from *cercomonas*.

Under the novel name of *cercomonas coli hominis* May<sup>34</sup> described an organism discovered in the stools of a patient with carcinoma of the stomach and chronic intestinal catarrh. This, also, from the description and figures (see Figure 23 of this article) appears to be a *trichomonas*, and Schuberg is, no doubt, right in saying that it is one. Why he gave it the new name May does not say.

Roos<sup>35</sup> found flagellate parasites in the stools in a number of cases, and supposed they represented a number of distinct varieties, some being like those of Davaine, others like those of Marchand, others still like those of Zunker, and, again, after reading May's article, like the bodies described by that observer. This seems to have been caused by an indistinct knowledge of what the earlier observers had described. Some of Roos's figures represent typical *trichomonads*; his Figure 5, for example, is almost precisely like Miura's Figure 2 of the *trichomonas* found in the urethra, yet Roos calls this *cercomonas* Davaine. Altogether, the *naïveté* of the account is remarkable.

Epstein<sup>36</sup> has made extensive observations on flagellate protozoa found in the stools in twenty-six cases of infantile diarrhoea. Although Professor Hatschek determined these to belong to the genus *monocercomonas* Grassi, the full description and the figures in Epstein's excellent paper show certain differences as compared with those of Grassi. As the parasites seem common in Prague, we can, no doubt, expect further valuable results from their study in future. Some important clinical and pathological data of Epstein's will be mentioned later.

This short summary includes all the material available regarding flagella in the human intestines or their excretions. Diverse and often contradictory as the original documents often are, a careful study of them makes it certain that some species of *trichomonas*, or, in other words, some organisms closely related to the parasites so named by



Donné, are parasites at times in the human intestine. A consideration of the possible effects of the organisms must be postponed.

Organisms identical with some of those just mentioned (cercomonas mostly) have been found in the mouth (Steinberg, quoted by Leuckart, *loc. cit.*, p. 304); in abscess of the tonsil (Lenhartz<sup>37</sup>); in the nose (*ibid.*); in gangrene of the lung and in pleurisy (Kannenberg,<sup>38, 39</sup> Streng,<sup>40</sup> Litten,<sup>41</sup> Lenhartz, *loc. cit.*; and Roos, *loc. cit.*). Important in connection with the subject of flagellate parasitism, these reports are not of a kind to detain us longer at this time.

Observations on flagellates in the urine or bladder are few, but of great interest, and permit a critical examination much more readily than those relating to the intestines.

The first observation on flagellates in the urine is usually said to be that of A. Hill Hassall.<sup>42\*</sup> An examination of Hassall's paper, however, makes it clear that his observations do not belong here at all. Hassall described the organisms he found under the name of *Bodo Ehrenberg*. The members of this genus have certain resemblances to trichomonas, but there are weighty reasons for believing that Hassall did not confuse the genera. In the first place he was familiar with Donné's figure, having copied it in his well-known work on microscopic anatomy (Vol. i, p. 134; Vol. ii, Plate xii, Fig. 6).<sup>43</sup> In the latter article he does not speak of trichomonas, as he would have been likely to do had he thought, as later authors have done, that he had found that parasite in the urine. More important still is his testimony regarding the vital characteristics of the so-called *bodo urinarius*. Hassall said this was "generated in urine which is alkaline, contains much animal matter, and which is, moreover, freely exposed to the air." The organisms appeared under the above conditions in three or four days, by which time trichomonads would have disappeared had they been present in the beginning. It is most probable that Hassall saw some infusorial monads, of no present importance whatever, and having no relation to human pathology.

In 1868, Salisbury<sup>44</sup> stated that "*trichimonas vaginæ* [*sic*—this form was used by some of the early writers] occurs occasionally in the bladder." Exact details are wanting.

Künstler, of Bordeaux, in 1883,<sup>45</sup> reported the first case in which flagellates were found in freshly passed urine. The case was one of pyelitis following cystotomy. In the copious sediment were bodies which Künstler thought might be cercomonads or the *bodo urinarius* of Hassall, although he remarked that they did not agree with Hassall's description. The bodies, he said, had two flagella, although at times it seemed as if three or four might be present. Künstler laid stress on the

\* This refers to human urine. From the time of Leeuwenhoek flagellates have been described, usually very vaguely, in the urine of lower animals.

fact that the parasites came from the interior of the patient's body, where they lived in company with various bacteria. From the classification of Braun<sup>49</sup> (p. 108), it appears that Künstler at a later date assigned the parasites to the genus *Plagiomonas* Grassi. I cannot find a reference, and from the original description can see no reason for such a classification. Braun's statement that Blanchard called Künstler's parasite *cystomonas urinarius* I am also unable to verify. It remains doubtful whether Künstler's parasites were really trichomonads.

Dr. F. Tilden Brown presented specimens and photographs of "ciliated infusoria in the urine" before the section of Genito-Urinary Surgery of the New York Academy of Medicine, December 12, 1893.<sup>46</sup> Dr. Brown has not yet reported the case in full, but from letters he was kind enough to write me, it appears that the organisms belong to the ciliata, and therefore do not come under consideration here. The observation is extremely interesting, inasmuch as it widens the horizon of the protozoan parasites of man.

The first undoubted case of trichomonas in the urinary tract of man is that of Marchand.<sup>10</sup>

The host was a man, aged sixty years, who had a fistula in the perineum. The fistula followed suppuration in the pelvis, of seventeen years' duration, thought to be tuberculous. Pus appeared suddenly in the urine without symptoms of cystitis, so that rupture into the bladder was suspected. The general condition improved, but the urine remained turbid and was sent to Marchand for examination. It was acid and albuminous, with a copious, dirty-yellow sediment. In the sediment were numerous whitish particles, made up of epithelial cells of different kinds, hyaline casts, and red blood-corpuscles. Among the epithelial cells were curious hyaline bodies, larger than leucocytes, which proved on closer examination to be flagellates. The urine was examined daily for some time, but the occurrence and condition of the parasites was variable, so that it was with great difficulty that their nature could be made out. The fresh urine always contained numerous bacilli and cocci. Tubercle bacilli could not be found. The flagellates were almost exclusively in loose epithelial cell masses.

Marchand's description and figures leave no doubt that the parasites he found in this case are identical with those I found and reported later. As the result of comparative examinations of the parasites from the bladder and those in the vagina, Marchand concluded that there is at least a great resemblance if not identity. The former he found more hyaline, less plainly vacuolated, smaller, and more amœboid than *trichomonas vaginalis*. He doubted, with a caution unusual in the history of the intestinal flagellates, whether these differences suffice to prove different species, and thought they depended on the different media in which the organisms live. In a note to Miura's article, Professor Marchand says he thinks it probable the parasites lived in the urethra.

From the history given it seems more probable there had been a rupture into the bladder, as supposed at first.

By a curious coincidence, a short time after publishing his own account, Professor Marchand received from Dr. K. Miura, of Tokio, the account in manuscript of another case in which trichomonads were found in the urine of a man.<sup>47</sup>

The patient was a Japanese, aged fifty-two years, with bronchitis and slight tenderness in the left renal region. The freshly passed urine, of yellow color and acid reaction, contained several thread-like particles and small bits. These were composed of round cells, colorless mucus, different kinds of epithelial cells, and flagellates. Miura examined the bodies with inadequate instruments, and his description of them is imperfect for that reason. He did not see all the flagella, although he was certain about the undulating membrane. He gave, however, other evidence as to the identity of the parasites. He found that most of the particles were passed with the first part of the urine, and by putting in a self-retaining catheter convinced himself that the organisms came from the urethra and not the bladder. The source of infection thus made probable was confirmed by examining the patient's wife, and finding in the vagina flagellate organisms resembling in form and size those in the urine of the man.

The next case, and only other, so far as I can learn, was one observed by myself and reported briefly in a preliminary note.<sup>48</sup>

The history is as follows: A. B., aged twenty-seven years, student. Father living and well. Mother died in childbirth. Patient was born in Illinois and lived there eleven years. Then lived near Gainesville, Texas, for thirteen years; in Oklahoma one year and a half; and in Bryan, Texas, one year. Since then has lived in Ann Arbor, with the exception of two months in Florida. As a child had measles, whooping cough, and scarlatina, without sequelæ.

For about nine years, while living in Texas, had malarial fever, usually of tertian type, sometimes quotidian. About 1884 had a "congestive chill" and was unconscious several days. Ever since then has had frequent urination. In the spring of 1892, while living at Bryan, Texas, had pneumonia. During convalescence painful and difficult urination came on, and after two days the urine became very bloody. This attack was considered one of malarial hæmaturia, and treated by quinine. The bleeding stopped, but difficult and painful urination continued. The symptoms became worse at irregular periods; they were made worse by "catching cold," by drinking whiskey in more than very small quantity, or by a change of drinking water. During the attacks patient has to urinate about every two hours. There is then pain in the left lumbar region and in the right groin, and at times pain radiating to the urethra. At the end of urination whitish particles are passed with the urine. They are more numerous two or three days after the attacks begin, but can be seen in the urine at all times. The urine has never had an ammoniacal color.

Patient denies venereal disease and coitus entirely. Smokes a good deal, drinks whiskey occasionally. Appetite good, bowels regular. Now feels fairly well, aside from the symptoms mentioned. Has lost about



eight pounds in the last year. The patient has consulted many physicians, some of whom have examined the urine. They have usually made the diagnosis of gleet and advised instrumental treatment, but, as the patient knew he could not have gleet, he has always declined. A few days before I saw the patient his urine was examined by a colleague, who informed me that there was in it a good deal of blood and pus. Boric acid and salol were prescribed.

*Status præsens.* Man of tall and slender frame; muscles small, but firm; panniculus scanty; no œdema. Skin dark and sallow; extensive capillary nævi on face and body; mucous membranes healthy looking. Examination of lungs, heart, and abdomen negative. No enlargement of spleen or liver. Examination by rectum negative.

Patient passes 25 c.cm. of urine without difficulty, and in full stream. This is pale yellow, clear, but with a number of small whitish flakes about the size of pin-heads, and a small amount of clear mucus in the last part. The urine is acid, sp. gr. 1020; no sugar nor albumin. The particles mentioned look like caseous bits, but are less opaque. Microscopically they are made up of pus corpuscles, bladder epithelium of all kinds, and a number of bodies slightly larger than pus corpuscles, of a peculiar amyloid appearance.

It was very soon apparent (at the first examination) that these were animal parasites, and, as I propose to describe them in full later, I omit the notes made at the time, as well as the full notes taken from time to time after that.

*October 25th.* Examination of blood: Blood flows freely, of good color and consistence. Hæmoglobin (Fleischl), 100 per cent.; red blood-corpuscles (Thoma-Zeiss), 5,860,000; leucocytes, 8333. Red corpuscles are of normal appearance and form good rolls. Leucocytes show normal differential count. No parasites found in the fresh or stained blood.

From this time the patient remained comparatively free from symptoms, though the particles were passed as before. From gratitude at the improvement, and scientific zeal, he enabled me to examine his freshly passed urine at frequent intervals, sometimes daily, and to make all the necessary examinations, inoculations, etc.

I discovered very early that the particles are of two kinds. Some are small, or rarely long and narrow; opaque, with distinct outlines. These are made up of pus corpuscles (polynuclear neutrophile cells, with a few eosinophiles). They rarely contain parasites. The others vary in size, sometimes being two or three millimetres in diameter. They are less opaque than the others, sometimes quite gelatinous looking. They are composed of large squamous epithelial cells, transition cells of various sizes, a few leucocytes, and parasites in variable numbers. Once I counted three hundred and fifty parasites in a single particle, which, when spread under the cover-glass, measured about 3 mm. in diameter.

November 15th the patient caught cold at a foot-ball game. That night he had pain in the back and frequent urination. Next day the parasites were more numerous than they had been for some time. In the night of November 19th the patient went out to urinate. He felt a sharp pain in the penis, and on returning to the house found some blood on his shirt. The next morning I found two or three blood-spots on the shirt. The urine contained a few red blood-corpuscles; parasites as before.

From this time the history of the case has been much the same.

There have been no severe attacks of pain. The patient rarely has to get up at night. He has gained fifteen pounds, and says he feels better than at any time for ten years. The urine usually contains a few small particles, nearly always with parasites, but sometimes without any for several days at a time.

After a mild attack of influenza, during which the patient took salol and phenacetin, the parasites were more numerous, but the symptoms were not so severe as they had been after previous temporary illnesses.

When I first found the organisms I thought I had discovered a new species. The characteristic features of the bodies I saw were not mentioned as belonging to trichomonas in the hand-books in my laboratory and I was not familiar with the recent and more accurate investigations. Fortunately, I was able to demonstrate the first specimen found to my colleague, Dr. J. Playfair McMurrich, who at once determined the genus. This has been amply confirmed since then by the observations I have made and the examination of the literature of the subject. I have been able to demonstrate the parasites to a large number of my colleagues in the medical department and the department of animal morphology, and to exhibit them alive at a meeting of the Journal Club (biological) of the University.

As regards the species I am in the same position as Marchand. The parasites I have studied agree with his descriptions more than with any others. He found slight differences as compared with *tr. vaginalis*, but not enough to lead him to give a new specific name. I have not been able since I found the bladder parasite to make examinations of *tr. vaginalis*. I think it better, for that reason, to describe the parasites as fully as possible, leaving the question of classification to other observers or the result of future comparative examinations.

My own examinations have been very numerous, and included the observation of the parasites alive under various conditions for hours at a time, almost daily for long periods, the study of the effects of reagents, staining, cultures, and inoculations. My microscopic observations were all made with Zeiss D D., and one-twelfth-inch oil-immersion lenses.

**ZOOLOGICAL CLASSIFICATION.** *Trichomonas* belongs to the flagellate infusoria. In the classification of Bütschli, one of the most rational which has been attempted as regards the form we are now considering, it is placed in the sub-order Isomastigoda and family Tetramitina. This family includes the closely related *cercomonas* Davaine, and *trichomonas intestinalis* Leuckart, which Bütschli includes under the generic name *monocercomonas* Grassi. According to the same author, about three species of trichomonas are known. All are parasitic, living in the intestines of frogs, snails, and other lower animals, and in the human vagina.

Grassi, as mentioned before, includes some of the species in his genus *Monocercomonas*; others in that of *Cimænomonas*. *Trichomonas vagi-*

*nalis*, with which he was not familiar, he thought might belong in the family he called Trichomonadidea; this, and his description of that family, gives conclusive evidence that his statements regarding his unfamiliarity with *tr. vaginalis* are true.

In the latest classification, that of Braun (*loc. cit.*, p. 108), the genus *Trichomonas* includes *tr. vaginalis* Donn , and *trichomonas hominis* Davaine. The latter includes *cercomonas hominis* Dav.; *cerc. intest.* Lambl (1875), Marchand; *trichomonas intest.* Leuckart; and *monocercomonas resp. cimenomonas* Grassi.

Evidently what is needed concerning the flagellate parasites is not so much classification and nomenclature as objective study. Braun deserves credit for restoring Donn 's term, and is justified by the rule of priority, notwithstanding the imperfect description and etymological incorrectness of the French observer. The wisdom of including *cercomonas* in the same genus may be questioned.

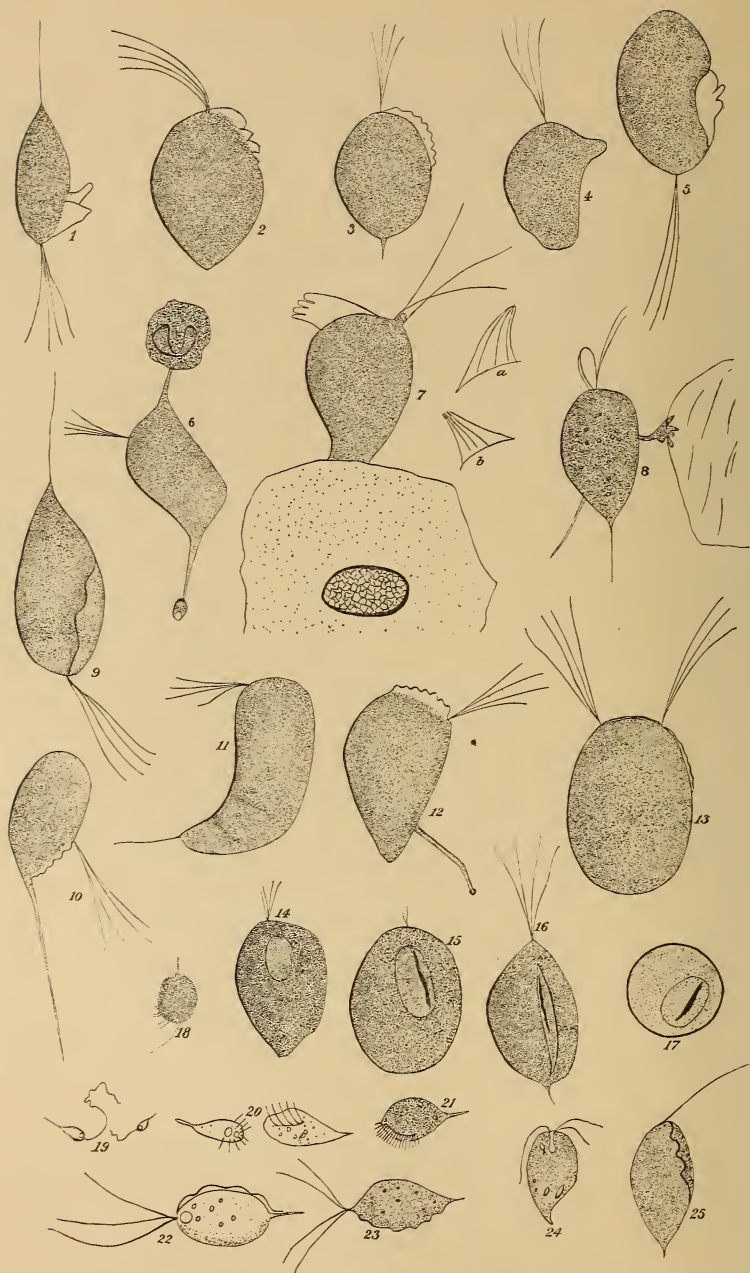
SIZE, FORM AND STRUCTURE OF THE PARASITES. *Trichomonas vaginalis* is said by all who give measurements to be from 15 to 25 m.m. in length, 7 to 15 m.m. in width. The organisms found by Marchand and Miura in the urine were about the same size. A number of measurements in my own case showed that most of the bodies are from 15 to 22 m.m. in length and 10 to 15 m.m. in width, but a few are considerably larger and some smaller.

The form of the organism also agrees with the descriptions of others. The commonest or typical form is a pyriform or broad spindle with one end rounded, or the shape of an apple-seed or almond-kernel. Sometimes the broad end is in front, sometimes behind. Sometimes the bodies are elliptical or oval; sometimes irregular (see figures). Donn  early described changes of form like those in a leech. Without knowing that, I had compared the appearance to that of a garden slug. Occasionally, as will be described later, the form is altered as the result of special motion. Usually the smaller specimens are more typical in shape than larger ones. The bodies appear to be flattened from above downward.

The general appearance of the organisms is sometimes peculiar, so that they can be distinguished by tint or refraction before the characteristic organs are seen. Light and amplification have much to do with these things; in general the bodies are difficult to distinguish from leucocytes or other cells of similar size in the preparation until the motion of their peculiar organs is recognized. The outlines are usually sharp, the structure finely granular, sometimes hyaline and homogeneous, rarely coarsely granular.

The protoplasm is not easy to differentiate into separate parts. K nstler claimed for *tr. vaginalis* the existence of a cuticular layer,<sup>6</sup> in addition to an ectoplasm. Marchand also describes a similar





Figs. 1-13. *Trichomonas* from the bladder. Drawn from different live specimens as seen with Zeiss 1-12th inch immersion objective and No. 2 ocular. Drawn approximately to the same scale and enlarged in the plate. For details see text.

Fig. 14. As stained alive in watery methylen-blue solution. Fig. 15. After fixing with sublimate and staining with methylen-blue. Fig. 16. Fixed by sublimate; stained with acetic-carmin. Fig. 17. Late stage after treating with acetic-carmin. Fig. 18. *Trichomonas vaginalis* as depicted by Donn . After HASSALL. Fig. 19. *Cercomonas hominis*. After DAVAINF. Fig. 20. Marchand's parasite from typhoid stool, 1875. Fig. 21. Zunker's parasite. Fig. 22. *Trichomonas hominis*. After GRASSI. Fig. 23. *Cercomonas coli hominis*. MAY. Fig. 24. *Trichomonas intestinalis* (Marchand). After ROOS. Fig. 25. *Cercomonas hominis* (Davaine). "After ROOS. Figures 18-25 are reproduced as nearly as possible in the sizes of the originals.

layer in the bladder parasite. I have never been able to demonstrate this, and the occurrence of pseudopods, to be described below, seems incompatible with a true cuticle. A differentiation into ecto- and endoplasm can, however, be made out, and the ectoplasm may in some cases simulate a cuticle. I have found the difference between the two layers well brought out by treating the organisms with (Gram's) iodine solution. The endoplasm retracts slightly in some places, and stains deeply after considerable time, leaving a thin and faintly stained membranous layer outside. Both in unstained and stained specimens the inner layer of protoplasm has a finely vacuolated appearance when examined by high powers.

Small vacuoles or highly refracting granules can sometimes be seen in the bodies, but there is no contractile vesicle. This agrees with the statements of all who have examined *tr. vaginalis*. In the parasites I have examined I have never been able to recognize any particular inclusions such as bacteria, which others have found in *tr. vaginalis*. This may be due to the fact that the urine in my case seldom contained bacteria while under examination or while the parasites were still alive.

EFFECTS OF STAINS AND REAGENTS. The parasites are difficult and unsatisfactory to stain. The best results are obtained by staining alive, or by staining specimens recently killed by sublimate. Placed alive or after being killed by sublimate in methylen-blue solution, the parasites remain as clear bodies long after all other cells are deeply stained. Afterward the bodies become stained, and look coarsely granular or finely vacuolated according to the degree of amplification. In such preparations the nucleus appears as described below. Neutral-red is not as satisfactory as methylen-blue in staining live specimens. In dried preparations, fixed by heat, alcohol and ether, osmic acid, bichloride, or formalin, stains of all kinds are very unsatisfactory for the protoplasm, and usually also for the nucleus. In preparations fixed on the cover-glass, and stained by methylen-blue, a spiral line can sometimes be seen, extending from the insertion of the flagellum or near it, a variable distance backward. This has been noticed by others. I think it an artefact, as it is extremely rare.

Strong sublimate solution (5 per cent.) has the effect of rendering the organisms motionless at once and making their protoplasm more granular, no doubt as the result of coagulation. It often produces contraction in the bodies, and especially causes the appearance of two highly refracting lines nearly or quite parallel, and in a direction similar to that of the nucleus. These lines I am quite confident are the result of contraction. They appear also under the influence of acetic acid. Similar appearances have probably led to the idea of internal organs, or of a "rib," or "keel" in or on the body.

Acetic acid, besides bringing out the nucleus, clears up the proto-

plasm. Later the bodies become round and numerous granules can then be seen. These are often in rows or lines, but do not have a definite arrangement, as some authors have described in *tr. vaginalis*.

In unstained specimens the nucleus cannot be seen. Sometimes, with low powers, a bright or dark spot, depending on the focus, can be seen near the front of the body, as is also the case with *cercomonas*. This I think is only the effect of the refraction of the body. By the use of reagents, however, the nucleus can be plainly seen, and its characteristics examined. The nucleus is always in the anterior part, usually lying somewhat obliquely. Acetic acid brings out in this part a round or oval, highly refracting body, which comparative examinations prove to be the nucleus. It appears some time later than the nuclei of leucocytes or epithelial cells in the same preparation. Sometimes the highly refracting nucleus is enclosed by two lines, as mentioned in speaking of the protoplasm (Fig. 16).

In preparations stained with methylen-blue alive or after killing with sublimate, an oval area appears, sometimes with a dark vesicular outline, sometimes with a diffuse stain deeper than that of the protoplasm, but less granular. At other times a clear vesicle appears, and in it a long deeply stained body, the nucleolus of many writers, more properly spoken of as the chromatin-body. Around this is a clear area.

The nucleus is best demonstrated by staining live parasites in acetic carmine. This clears up the protoplasm, brings out the nuclear-membrane, and stains the chromatin-body deeply and distinctly. It then appears as a long and narrow, somewhat irregular body. The lines on both sides of the nucleus are present in the beginning, but after a few hours the bodies become round, the contents clear, with the nuclear membrane and chromatin-body, as in Fig. 17. The nucleus is about one-fourth to one-third the length of the body of the parasite.

At the anterior end of the organism are the flagella, concerning the history of which a few words are necessary. Donn  described only one of these, but said it was sometimes bifurcated. Scanzoni and K lliker saw two or three. K nstler was the first to claim that four was the constant number. This was denied by Blochmann and B tschli, but confirmed by Hennequy, and Marchand found this number in both the vaginal and bladder parasites, but agrees with K nstler in saying that it is not always easy to recognize all four. After very extensive observations on this particular point I agree with K nstler. Often only one, two, or three flagella can be seen, even in a prolonged observation on the live organism. This is especially the case when the parasites are active. If, however, they are suddenly killed, as with saturated sublimate solutions, four flagella can be distinctly seen. In specimens which die naturally, or sometimes in those killed with iodine, it can be seen that



one flagellum is thicker than the other one or two, as is not the case when all four are seen.

The length of the flagella in my examples varied from one to three times the length of the body. Usually these organs are about one and a half to twice the length of the body. The flagella seem to taper slightly from their insertion to the tips. Blochmann and Künstler have carried on an argument about the tapering of the flagella of *tr. vaginalis*, and Künstler, who asserts that they taper, admits that the appearance may be the result of transparency. (See Bütschli, *loc. cit.*, p. 673.)

The flagella usually rise so close together that they seem adherent at the base, or to arise from a common pedicle. That they do not do this I am convinced by finding them separated at the base by a short pseudopod (Fig. 7) in one instance. Künstler held that the flagella arise from a sort of "rostral prolongation" of the body, a view which Marchand seems to support. In my own case I could find no evidence of it. The flagella have very clear outlines and a fine homogeneous structure. I could never see any evidence that they are sticky, as are the flagella of some other protozoa. I have made many efforts to stain the flagella, but without satisfactory results.

The posterior end of the body is sometimes prolonged into a long tail-like process. Donn  no doubt saw this, as he said that the organisms fix themselves to the cover-glass, "not by suckers, but by a sort of viscous material which leaves a trail behind it." This appearance I have often seen. It seems to be due to the formation of a thin, soft, adhesive pseudopod. At other times a sharply-outlined tail is present, which may resemble a flagellum, but usually differs in its more granular structure and its less distinct outline, and also by its lack of flagellar motion. It is, moreover, capable of marked change of form, and is often retracted, or contracted and expanded, showing its close relation to pseudopodial structures. The tail is likely to be adherent to various objects in its vicinity—leucocytes, other parasites, or granules of broken down leucocytes. Not infrequently one can see two parasites attached by the tails, which often show curious changes of shape. This has led some to think the organisms undergo transverse division, but I have never been able to find evidence of the earlier stages of such a process. The most remarkable thing about the tail is that it may be absent from all the organisms examined for many days, and then be found on almost all examples in another specimen, so that when one finds one parasite with a long tail it is safe to predict that most of them will have them. In such cases a preparation containing a number of parasites presents a curious appearance, as if full of gigantic spermatozoa. It may be necessary to add that no error can be made between these two objects if one has other guides to the size of the organisms, as leucocytes in the field, or familiarity with the microscope, so that the grotesque fig-

ures in a recent work on *Medical Jurisprudence* are not necessary in order to avoid confusion.

The most interesting part of the parasite, in many ways, is the undulating membrane. Donné thought the organism he discovered had a row of short cilia on one side, near the anterior end, and this error was handed down from one observer to another, until Künstler confirmed Stein's assertion, based on the relations in the trichomonas of the frog, that the so-called ciliary comb was an undulating membrane. The discovery of Künstler was confirmed by Blochmann and Bütschli. In my own case, although usually visible, in some examples the undulating membrane could never be seen, so that I think it can be temporarily absent. I found it absent usually in those parasites which exhibited most marked change of form, and it seems probable that there may be some relation between the two things, so that one function can replace the other under certain circumstances. Stein was of the opinion that the undulating membrane of trichomonas is not a permanent structure, in fact not a true membrane, but is due to the alternate projection and retraction of a part of the body; but this is denied by Bütschli. Opinions differ as to the extent and insertion of the membrane in *tr. vag.* Künstler claimed that the membrane passes around the body of the parasite in a spiral line, being inserted in a sort of rib, but he admitted that it is only by a "lucky chance" that one can see the whole membrane. Blochmann, however, thought the membrane half as long as the body, and in this Marchand agrees with him.

I have never found the membrane more than two-thirds the length of the body, extending from the insertion of the flagella backward; often it is much shorter. The membrane is sometimes on one side of the body, sometimes the other. It may extend out from the side of the body or be turned over or under it, or it may arise from a straight or spiral line on the anterior surface of the body, facing the observer. No distinct line, ridge, or depression can be seen at its origin, and it often gives the impression of a gradual thinning out of the side of the parasite. The membrane varies much in width, and this variation is independent of the shape of the body. The outer edge of the membrane is sometimes thickened and so resembles a flagellum, but this is not constant. Very rarely have I been able to see the membrane prolonged to a point. Usually the posterior end tapers gradually to the side of the parasite. Owing to the fact that the outer edge is much longer than the insertion, the undulating membrane is always more or less zigzag, fluted, or scalloped, so that from the folds and the zigzags the appearance of a row of cilia is often very closely simulated. The membrane does not stain well.

The organisms I have seen have no signs of mouth or other digestive organs. Donné thought there probably was a mouth, but did not assert

it as a fact, as has been claimed. Blochmann and Bütschli could not find one. Künstler claimed to find mouth and œsophagus, and claims that Gasser (*loc. cit.*, p. 35) described the mouth as a *cavité cupuliforme*. Marchand could not find it in live specimens, but in stained ones he saw tubular structures extending forward from the nucleus. I believe that some observers have mistaken the appearance produced by the undulating membrane, as it plays along the middle of the body, for the mouth. In such a case a narrow clear space appears to be in the body at that part. Another thing which Donn   perhaps thought was the mouth I have often seen. This is a shallow depression or cleft near the insertion of the flagella, which no doubt has the function of a mouth. At times one side keeps up a nibbling motion, which is very suggestive of a mouth. The appearance is not permanent, however, and is rather uncommon.

**PHYSIOLOGICAL CHARACTERISTICS.** The phenomena of motion presented by trichomonas are extremely interesting. The simplest is due to contractions of part of the body, with change of form, as Donn   mentioned. This enables the organisms to change their position to a considerable extent, so that in a few minutes one may move across the field. Such extensive motion, however, is unusual, and the process is generally limited to jerking movements of the body in different directions.

Another process consists in the projection of lobes, usually combined with contractions, so that amœboid motion is simulated. True amœboid motion, in which, along with a projection of the ectosarc there is a flowing in of the endosarc, I have not seen, and the changes of form and position are never so great as in typically amœboid organisms. That this function indicates the existence of a cuticular membrane is not a necessary conclusion, as some zo  logists have claimed, but it can be brought about by contractions of the outer layer of the plasma or of the plasma as a whole (B  tschli, *loc. cit.*, 849). I have also seen another process, mentioned by Blochmann and by K  nstler. This consists in the appearance of a scalloped edge on one side the body, with a wave-like motion running along it. I have only seen this in dying organisms and take it to be peculiar to that stage.

Another function exhibited by trichomonas consists in the formation and motion of pseudopods. My observations indicate that this is an important function. K  nstler and Marchand seem to be the only observers who have noticed pseudopodial formation in trichomonas, but I have been fortunate in seeing it oftener and more specialized than they seem to have done. It can occur in any part of the body. In the simplest form short knob-like projections appear on the body. (Fig. 7.) Much more frequently a long narrow process is formed, usually becoming fixed to something in the vicinity. (Figs. 6, 8, and 10.) Pseudopods



of this kind often serve as organs of support. So in the parasite from which Fig. 12 was taken, the end of the process was fixed to the cover-glass like a sucker. The animal then made rapid and abrupt bobbing movements resembling a duck diving for food. The pseudopod at such times bent at an angle, always in the same place. The body of the parasite at the same time changed its shape considerably, so that the undulating membrane, which, at first, ran down over the back, came to be in front. At times a tail was present. At the anterior end a cleft often formed, and exhibited the nibbling motion in its sides, as mentioned above. The flagella and membrane were in active motion all the time. The narrow pseudopods expand and contract at times in different parts. The most remarkable pseudopodial action I have seen is depicted in Fig. 8. A similar process was seen several times. Here a pseudopod was passed over or under the side of an epithelial cell. The end then expanded and became branched, resembling a very irregular minute amoeba. The lobules of the extremity then kept up a constant and somewhat rapid amoeboid motion, resembling precisely that of an endoglobular malarial parasite. Sometimes the ends kept up a rhythmic motion, giving a revolving effect. This pseudopodial function seems to be an important one in the nutrition of the parasite, especially when for any reason the flagella and undulating membrane cannot act.

The motion of the flagella is whip-like usually, but, at times, spiral, the waves always running from the insertion to the tip. Motion is not directed always in the same direction, as claimed by some in the case of *trichomonas vaginalis*. Sometimes the motion is toward the side of the undulating membrane, again toward the opposite side. Usually it is directly forward. Sometimes one flagellum has a different direction from the rest, bending down along one side, or across the body. Sometimes a flagellum turns down along one side, and, without touching anything, acts as a point from which the whole body moves, apparently as the result of a powerful action of the flagellum. By their ordinary motion the flagella produce a current toward their insertion, causing granules in the fluid to shoot with great velocity against the anterior end of the body. At such times the appearance of a mouth is often produced, the granules apparently being taken in by stomata which form and disappear.

The motion of the undulating membrane is usually a waving one from before backward, due to the ciliary motion of the edge; sometimes the motion is apparently spiral. The rapidity of the motion varies very much, and this, with the difference in the width of the membrane, gives great variety to the appearances presented. Sometimes close folds are produced, sometimes zigzags advance and retract along the edge, and often the membrane seems to be actually revolving, like the arms of a windmill. Sometimes the general direction of the membrane is greatly altered, as shown in Fig. 7, *a* and *b*.

The membrane also produces a current which runs toward the anterior end, carrying floating granules with it.

That the membrane, as well as the flagella, acts as an organ of locomotion seems likely, but I have never seen it. Even in the hanging drop on the warm stage I have never seen the parasites swimming freely. In this respect they offer a marked contrast with *cercomonas* Davaine. According to Künstler the undulating membrane acts as a locomotor organ when the parasites are closely surrounded, enabling them to move as a serpent does.

The trichomonas, as I have found it, is extremely sensitive to external conditions. Kept in an incubator, in the urine as passed, the parasites remain alive and active for six or seven hours. In the usual room temperature they die an hour or two earlier. Organisms dying in this way often show a few short, straight, hair-like processes on various parts of the body. These are not bacteria, but are most probably like the similar processes sometimes present on dead or dying cells of various kinds.

If a preparation containing parasites is examined from time to time without allowing it to evaporate the organisms completely disappear, and nothing remains that can be recognized as derived from them. The same is true of specimens kept in an incubator for twenty-four hours or more.

Cold is injurious to the organisms, so that on the slide in a cold room little or no motion is seen, but if the room is warmed, or the preparation put on a warm stage, motion soon becomes active. All the phenomena of motion are marked at a temperature of 80° F., more active still at 98°, but cease in a few minutes if the warm stage is heated up to 120°.

When the organisms are becoming sluggish from long stay out of the body they cannot be revived by heat. The addition of dilute alkalies, which stimulates some protozoa, has no effect on them, but stronger solutions are injurious.

The organisms occur always, as I have said before, in acid urine. Künstler has called attention to the fact that *trichomonas vaginalis* also lives in an acid medium, a fact on which Donn  laid considerable stress, and which seems to have few exceptions, Haussmann saying they occur in alkaline secretions, though not in large numbers.

As the parasites are an robic—as Künstler showed *tr. vaginalis* to be—I made an effort to grow them in that condition. I was fortunate in getting my friend, Dr. F. G. Novy, to make some trials with the admirable apparatus devised by him (*Centralblatt f r Bakt. und Parasit.*, 1893, Bd. xiv. p. 581). We tried urine, as well as numerous culture solutions, but without effect. The parasites disappeared just as they did when exposed to the air.

Mercuric chloride kills the motion and at the same time fixes the organisms. Compound solution of iodine also stops motion of all kinds at once.

When the bodies are dropped into saturated solution of sulphate of quinine the motion of the flagella and of the undulating membrane stops at once. In a few (three) minutes the bodies swell out and become clear, with bright granules scattered through them, sometimes arranged in lines. The bodies are very soft, as shown by the indentation produced by other bodies pressing on them. A little later the flagella and undulating membrane begin a spasmodic jerking motion. The bodies become larger and larger, the undulating membrane very narrow. Hyaline vesicles break out from the sides of the swollen bodies. The motion of the flagella sometimes lasts for an hour, by which time, however, the bodies are usually only large collections of clear vesicles. The process here seems partly poisonous, partly due to imbibition as the result of paralysis. Water alone does not produce the vesicular change so rapidly.

Salicylic and boric acids cause similar changes. No appreciable difference in rapidity can be seen in the action of these various drugs.

Efforts to grow the organisms in the bodies of animals failed. I first tried the vagina and bladder of guinea-pigs and rabbits. As the urine of these animals is very alkaline I used a large bitch. After the first trial under chloroform it was possible to catheterize the animal without an anæsthetic, so that the experiment was quite simple. Although a vaginitis and mild cystitis occurred from intentional irritation with the end of the (glass) catheter, no flagellates appeared as the result of numerous injections of epithelial bits containing active parasites. The dog's urine, however, though acid, is not identical with that of man, so that I do not consider the experiments very conclusive. Experiments on man could not be made.

REPRODUCTION. It is generally admitted that all flagellates multiply by longitudinal division, although some have other methods besides. Künstler and Marchand have observed longitudinal division in *tr. vaginalis*, the latter finding frequent evidence of it. In my experience the process has been very rare. I have seen it only twice, once in a preparation stained by acetic carmine, and once in a live specimen. (Fig. 13.) In the latter, a very large body, there were two sets of flagella and two undulating membranes, one being between the sets of flagella. In trying to stain the organism alive I lost it. (It might be thought that this figure represents a copulation-process. From what we know of this among the flagella, however, such is not the case.)

Of the formation of "dauer" spores, etc., in *trichomonas*, nothing is known, but from the number of parasites often present in my case and the scarcity of dividing bodies it seems there must be some other method of reproduction than that by division.



MODE OF INFECTION BY TRICHOMONAS. From our present knowledge of the distribution of trichomonas it is impossible to explain its mode of entrance in man. The most probable explanation is that it exists in some other form, perhaps in water or on plants, and gains entrance to various animals in that way. The theory of Cunningham that both cercomonads and trichomonads are nothing but zoospores of amœbæ, inviting as it is, has not been confirmed. Perroncito,<sup>50</sup> who has made a special study of cercomonas, claims that it becomes encysted, forming "dauer" forms, which are more resistant to external influences than the active forms, and are readily transported, and so enters the human body. May thought his patient had been infected by drinking-water, and Epstein brings almost conclusive proof that the organisms found by him entered the body in the drinking-water. He noticed, for example, that sucklings who never drank water never had the protozoan diarrhœa. At one time three children in one room got the disease simultaneously. A fourth child in the same room, by reason of his condition, drank no water. After demonstrating that the stools of this child were free from flagellates, he was given in the course of twenty-four hours 250 c.cm. of water from the pump from which the other children were supplied. On the same day flagellates appeared in the stools, which soon became watery, were forcibly ejected, and later showed large numbers of parasites. The so-called monocercomonads could not be found in the water, nor any form with which they could be supposed to have relationship. (It is an interesting fact that the water in question came from the pump used by the patients with amœbic dysentery reported some years ago by Hlava.<sup>51</sup> Epstein makes the important statement that amœbæ have been found in that water.)

It is, of course, possible that the water contained organisms in numbers too small to enable them to be discovered. Whether that is true, or that the organisms existed in the water in another form, their prompt appearance in the stools of Epstein's patient is a noteworthy fact, indicating rapid reproduction under favorable circumstances. It is easier, however, to imagine how organisms of this kind can enter the intestine than to explain how they enter the vagina, especially since injections of ordinary water kill the developed forms. Balbiani (cited by Henneguy<sup>7</sup>) thinks that the flagellates may be swallowed in water, set free in the intestine, and wander from the anus along the perineum into the vagina, as does oxyuris. If Schuberg is correct in thinking the flagellates almost constant inhabitants of the intestine, this theory would have much in its favor.

In the cases in which flagellates were found in the urine of men the question as to mode of entrance is extremely interesting. In Künstler's case one can suppose the organisms came from the intestine and gained entrance to the bladder through the perineal wound. If in Marchand's

case there really was a rupture of the intestine into the bladder, as the history makes probable, we should have important evidence regarding the intestinal flagellates, as well as a ready explanation of the mode of infection. If, on the other hand, as Marchand thinks, there was an infection of the urethra, as happened in Miura's case, the manner of infection is clear, but the question arises why such urethral infection is not more frequent in places where *trichomonas vaginalis* is as frequent as some authors have found it. (Scanzoni and K  lliker in more than half, Haussmann in as many as forty per cent. of women examined, K  nstler in nearly all women who had leucorrh  a and did not use injections.)

In my own case the relations seem to be unique. Not only the assertions of the patient, but also the characteristics of the urine, exclude infection by the urethra, and I think we must admit that the parasites reached the urinary tract indirectly. Such an event is, of course, no more remarkable in itself than many well-established facts in pathology.

PATHOLOGICAL IMPORTANCE OF THE FLAGELLATES. The question remains, have the organisms under discussion any pathogenic powers or are they simple "commensals?"

When Donn   first reported the existence of *trichomonas vaginalis* he thought it characteristic of venereal blennorrhagia, though he did not commit himself to the belief in its casual relation. Later, he thought the organism had no specific importance, as he found it in muco-purulent discharges due to irritants of all kinds, *e. g.*, pessaries. Scanzoni and K  lliker thought the parasites had no specific action, but believed they were never found in the normal vaginal secretions. K  nstler thought they must have pathogenic action, but not of a specific kind. The prevalent opinion among recent writers is that the organisms are accidental parasites in the vagina and mere "commensals." Here, of course, the organisms are never alone, but always accompanied by bacteria, many of which are pathogenic, so that it is impossible at present to assert that the animal parasites produce the disease with which they are associated. This does not imply that they have no pathogenic action.

As regards the intestinal parasites, the general opinion is that at the most the flagellates can by their presence keep up a diarrh  a which furnishes favorable conditions for their development. Many writers, especially Cunningham, Grassi, and Schuberg, think the organisms common parasites of the intestine. The clinical observations of Epstein, however, show that at least some of the intestinal flagellates can produce diarrh  a in man, and Perroncito (*loc. cit.*) claims that a species of intestinal cercomonas causes a fatal disease in guinea-pigs.

In the cases of K  nstler, Marchand, and Miura the flagellates were associated in the urine with bacteria, so that no conclusion can be drawn as to their relation to disease.

In my own case the conditions were simpler and seem to me to require a revision of the whole subject.

The patient has had for some months, while under observation, a peculiar pathological process in the urinary tract, presumably in the bladder. It is probable the condition has existed for many years. This process is distinguished by an exudation of leucocytes and a desquamation of epithelial cells such as occurs in many cases when there is local disease in the organs concerned. So, for example, a tubercular nodule, a localized gonorrhœal infection might have such results. In this case, however, there is no sign or history of stone and no sign of bacterial infection. Culture experiments, repeated under various conditions, ærobic and anerobic, show no bacteria at all, and bacteria are invariably absent from cover-glass preparations when pains are taken to exclude contamination from the outside of the body. I am therefore forced to the conclusion that the parasites have produced the anatomical alterations, the evidence of which is so clear.

There is another feature which deserves consideration—the hæmaturia. Although this has not been excessive since the patient came under my observation, it has at least been at times out of proportion to the exudation. It must be remembered that since the patient has been under my care remedies have been used, more or less regularly, which must have a harmful effect on the parasites and lessen their activity.

I have in another place (*Hare's System of Practical Therapeutics*, vol. ii. p. 356) expressed my doubt regarding the malarial nature of certain cases of hæmaturia occurring in the Southern States. When in Texas, besides cases of undoubted malarial hæmaturia, I saw others which showed no evidence of malaria. It is well known that there is an apparently endless controversy regarding the treatment of such cases, a fact in striking contrast to the conditions in other malarial diseases. I did not see these cases under circumstances favorable for investigation, however, and often had to be satisfied with the examination of specimens sent a long distance. I suggested that some of these cases might be due to filaria or to Bilharzia, although I could find no positive evidence. In the light of the case now reported I do not think trichomonas can be left unconsidered in future investigations on this important subject.

In connection with this it is interesting to recall the cases in which amœbæ were found in the urine, reported by Baelz,<sup>52</sup> Jürgens,<sup>53</sup> Kartulis,<sup>54</sup> and Posner.<sup>55</sup> These are important clinically and anatomically because in three cases there was hæmaturia, and in the fourth (Jürgens), the clinical details of which are wanting, hemorrhagic lesions in the bladder. This was the only case in which an autopsy was obtained. (Posner's case was the only one remaining alive.) Jürgens found small cysts in the thickened bladder-wall full of amœbæ. In Posner's case there were



evidences that the kidney was affected, without signs of disease of the bladder. Posner thought the amœbæ had become encysted in the kidney, and so caused hæmaturia and nephritis. In this case, the only one observed for more than a short time, the patient had five attacks of hæmaturia in the course of several months. In the case of Baelz, a girl with tuberculosis of the lungs and genito-urinary tract, amœbæ were found in the vagina, and the observer thought they had entered that organ in washing, increased there, and then gained entrance to the urethra and bladder. In Jürgens's case, also a woman, bodies were found in the vagina which seemed to be earlier forms of the parasite. Posner thought that in his patient, a man, the parasites had entered the urethra and travelled up.

Two things must be borne in mind in considering the pathological relations of trichomonas. In the first place, we cannot assume that this is a harmless parasite always, because of its occurrence in comparatively mild diseases of the vagina and intestine, for organisms innocuous on such surfaces might in the bladder, ureter, or kidney set up severe or dangerous processes. Here I recall the finding of several hundred parasites in one small bit of epithelium on one occasion, strongly suggestive of cysts such as Jürgens found in his amœba case.

In the second place, we must remember that this parasite is not necessarily as rare as the few cases reported might seem to indicate. The history of the amœba coli and that of the malarial hæmatozoon show the need of caution in this respect, and the trichomonas, like the other organisms just mentioned, can only be found if the substance containing it is examined under favorable conditions. That I found the bodies I attribute to the effort I always make to examine urine as soon as passed, a practice of great value in many ways. Experienced microscopists had examined the same case, but without taking that precaution, and without success.

The precise place of trichomonas in pathology can of course be fixed only by further observation and experiment. If I am wrong in attributing to it a pathogenic power it does not possess, I feel that my observations on it have at least some value as a contribution to the biology of the flagellate protozoa.

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## CRANIOTOMY (CRANIECTOMY) FOR IDIOCY.

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It is with some hesitation that I present the subject of craniotomy for the relief of idiocy and imbecility, for I find that the operation is not approved of by many, and has in a considerable degree fallen into disrepute and disuse. At the last meeting of the Congress of German Surgeons, Professor Bergmann, in his address on "Brain Surgery," made no mention whatever of this operation. At the last International Congress, Professor Jacobi, under the title *Non Nocere*, protested in vigorous language against the tampering by surgeons with the skull-caps of idiots. Quite recently Dr. Barbour, of Louisville, read a paper before the Louisville Medical Society on "Linear Craniotomy." He drew some unfavorable conclusions, and concluded with the Biblical injunction, *Mene, mene, tekel, upharsin*. Dr. Vance, in the subsequent discussion, stated that "the bottom had fallen out of the operation." Some two years ago Bournville, of Paris, published a long and elaborate article in which he showed, with a degree of explicitness quite unnecessary, in my opinion, that craniotomy does not and cannot affect the development of brains in which there are large cysts or in which portions of the brain are replaced by fibrous scars and sclerotic overgrowth.

All this would surely be sufficient to deter one from further study or practical utilization of craniotomy if it were not that certain other facts exist which must still be taken into consideration. It has so happened that in my personal experience I have seen idiotic and epileptic chil-



dren become better after the operation, and, very naturally, a few personal observations carry much greater weight than the opinion of even the most learned; then, again, through the skill and ingenuity of Dr. Seneca D. Powell the operation has been robbed of nearly all of its dangers, and has therefore been placed upon quite a different basis. While two years ago the mortality of the operation was placed by Starr at about 40 per cent., and while Dr. Keen, of Philadelphia, in 1891 stated that before operating he should explain to the parents that about one in four dies, the mortality rate now has been decreased to 5 per cent., or even less; so that one can at the present time say to the parents that only about one in twenty or twenty-five dies. In addition to this, a review of the cases that have recently been collected, more particularly those by Dr. Louis Masson (*Craumatismes Craniens*), shows a percentage of improvement of which one can hardly ignore the importance, even if the amount of this improvement is not very great. In another recent monograph by Ackermann (*Sammlung Klinische Vorträge*, 1894), the operation is reviewed, and the utility of it in proper cases is advocated. We also find words of support for the operation in the writings of Horsley, Keen, Starr, and Roswell Park. Therefore it seems to me that in the light, particularly, of the advance made in the *technique* which has led to the practical innocuousness of the operation, we should still continue to use it and keep up our studies upon it for a longer time. While I do not deny that five years from now we may possibly again lay it aside and say it is absolutely of no value, yet it would be unjust to our art and inhumane to a large class of most unfortunate sufferers to let the matter end here. I therefore beg to present the record of my own experience and the more recent cases of others.

CASE I.—Harry McN., aged four and a half years. This boy was an inmate of the New York Infant Asylum; he is therefore illegitimate, and nothing is known of his history up to the first year of his age. He was rachitic; his fontanelles were all tightly closed by the third year. During the first three years of his life the boy suffered with general convulsions, three or four such attacks occurring weekly. Up to the time of operation he was unable to swallow except when in a semi-recumbent position, and he could only take liquid food. He could not say a word and could barely express a thought. His senses of sight and hearing, smelling and tasting were preserved. He could walk and use his hands, though clumsily. Measurements of the head, March 23, 1892, showed the following:

|                                             |         |
|---------------------------------------------|---------|
| Great circumference . . . . .               | 45½ cm. |
| Naso-occipital arc . . . . .                | 30 "    |
| Naso bregmatic arc . . . . .                | 12 "    |
| Bregmato-lambdoid arc . . . . .             | 11 "    |
| Lambdo-occipital arc . . . . .              | 7 "     |
| Binauricular arc (through bregma) . . . . . | 29 "    |
| Binauricular arc (through lambda) . . . . . | 26.5 "  |

He was operated upon by Dr. Powell on March 25, 1892, and a long, linear craniotomy was performed on the left side, with two lateral branches running from the antero-posterior furrow. The child recovered from the operation without very much trouble. Within three weeks from the time of it he began to show symptoms of improvement in swallowing and in mastication. He also very soon began to talk, and there was noticed by the nurses a very striking increase in the child's intelligence. The boy was shown to the New York Neurological Society about a year after the operation, and I have recently another report of his condition dated as late as June 24, 1894. The measurements of the head show some increase in the great circumference, as the figures here given will indicate. The general opinion, both of the nurses and the house physicians at the time of the operation and for some months afterward, was that the boy had improved in a very striking way. He has had no epileptic fits since the operation; these, however, had ceased for some time before the operation was performed. Measurements of the head, June 24, 1894, showed the following:

|                                             |         |
|---------------------------------------------|---------|
| Great circumference . . . . .               | 47½ cm. |
| Naso-occipital arc . . . . .                | 31 "    |
| Naso-bregmatic arc . . . . .                | 12½ "   |
| Bregmato-lambdoid arc . . . . .             | 11½ "   |
| Lambdo-occipital arc . . . . .              | 7 "     |
| Binauricular arc (through bregma) . . . . . | 30½ "   |
| Binauricular arc (through lambda) . . . . . | 27 "    |

CASE II.—Beulah W., aged three years; only child, born at full term, normal labor. She soon developed convulsive attacks and by the third year had many weekly. She was idiotic, could not talk, and barely recognized her parents. Was noisy, constantly crying and screaming, and a source of great distress and care to the parents. She could not walk, and the legs and hands showed some rigidity. Head measured 47 cm. in great circumference. The patient was brought to me by Dr. Thomas H. Burchard, and was operated upon in the spring of 1891 by Dr. Robert Abbe, who did a linear craniotomy with lateral branches on the left side. The child made a good recovery. The parents removed a few months afterward to the West, but letters from them and a personal statement from Dr. Burchard dated a year and a half after the operation show that she was very much improved. The improvement consisted in an entire cessation of the epileptic fits for a period of at least six months, and a cessation of the horrible and continuous cries and tendency to noisy violence to which the child was subject.

CASE III.—Harry P., aged two years and nine months, was brought to me for examination by Dr. Titterington, of this city. His family history is good. The child was born at full term and was the first child; head presentation; no instruments; no asphyxia. The child seemed well up to the age of six months. Then the anterior fontanelles closed and evidences of idiocy and defective mental development appeared. The child has never walked and cannot say a word; cries considerably, but is not violent or bad-tempered; sleeps well; has no convulsions; cannot sit up nor use its hands; spastic condition of all extremities. Measurements of the head show:

|                               |          |
|-------------------------------|----------|
| Great circumference . . . . . | 46.5 cm. |
| Naso-occipital arc . . . . .  | 35 "     |
| Naso-bregmatic arc . . . . .  | 12 "     |

The child was operated upon by Dr. John R. Conway, of this city, at Bellevue Hospital, in July, 1893. Dr. Conway did a linear craniotomy on the left side in the usual way. A good recovery followed. A report as to the mental condition was given in December, 1893. Dr. Conway, who had seen the case, wrote me then: "The case of craniotomy is doing well and has improved greatly. Before she left the hospital there was a very decided improvement. The constant movement of the limbs ceased altogether; she became more intelligent in appearance, did not cry out aimlessly as she had been doing, but was quite docile and intelligent-looking. Another improvement was that she could take her food out of a spoon or glass, whereas she had never used anything but a nursing-bottle before." It had been understood that, if necessary, a second operation would be performed in the following year, and this operation was done on May 8, 1894. At that time I saw the child for a short time, and the same general statements about improvement were made. Measurements of the child's head at that time were not completely taken. The great circumference measured on the unshaven scalp was 47 cm. The previous measurements quoted above were made upon the shaven scalp. There was, therefore, a growth of the brain in the course of ten months equivalent to  $1\frac{1}{2}$  cm., allowing for the hair. A further report of the case is given me by Dr. Conway, dated April 2, 1895. Dr. Conway writes that the child left the hospital after the second operation in May, 1894. He was seen November 1, 1894, and was then walking alone and talking fairly well. This was also Dr. Titterington's report, and he was examined by him at that time. The child, it will be recalled, was unable to walk or talk at the time of the first operation in July, 1893, and it seems fair to infer that some of the very marked improvement in the child's development was due to the surgical operations.

CASE IV.—Theresa S., aged eight and a half years; first child, born naturally, head first; long, but not difficult labor; no asphyxia; no convulsions; child born alive. Teeth at seven months; walked in second year. Had a fall out of a high chair on her face when thirteen months old. Three weeks later began to have epileptic seizures. She would suddenly straighten her limbs, bend her head forward, chin drawn down, hands extended. This lasted for a moment. There were several daily for several weeks. During this time she was in a dull apathetic condition—no pain. Then she became irritable, noisy. She did not walk or notice things. Since two years past she has been getting somewhat better, but is still idiotic. She understands a few words and simple directions. Can't dress or feed herself. Is restless and noisy; eats and sleeps well. Has seizures—two or three daily—then goes for two or three weeks or a month without any. She can see and hear. Has no paraplegia. Teeth bad; weight good; height good. Head small, great circumference 48.5 cm.; naso-frontal arc 31 cm.

November, 1893, Dr. Powell did a linear craniotomy on the left side. No improvement. June 6, 1894, operation repeated on the right side. A year later, absolutely no improvement.

CASE V.—S. B. This patient was a child, aged five years; good hereditary history, except that a maternal uncle had a brain tumor. Birth normal; no instruments. Has developed slowly both physically and mentally, and is now imbecile and aphasic. The child has all the stamp of an idiot: bad teeth, deformed ears, small, irregular pupils,



peculiar shaped head. The child was operated on and died within twenty-four hours after operation.

CASE VI.—A boy, aged seven years; Italian parentage. Parents healthy; birth normal, as far as could be ascertained. The child developed slowly, showing ordinary signs of imbecility; epileptic convulsions also appeared. There was no hemiplegia or paralysis. The head was irregular in shape, but of average size. The child was operated on by Dr. Robert Abbe and made a good recovery, but there was no improvement in mental condition nor in epilepsy noted six months after the operation.

CASE VII.—A child, of German parentage, aged seven years, was sent to me by Dr. Carl Beck. He gave a history of imbecility and epilepsy, and the child presented the characteristics of these cases, but without any paralysis or hemiplegia. The head measurements were slightly below the normal, but there was no microcephalus. The child was operated upon by Dr. Carl Beck and made a recovery. He was seen by me six months later and there was no change either in the epileptic convulsions or in the mental state.

CASES VIII. and IX. were children, aged two and a half and three years, one with epilepsy-idiocy, the other idiotic and hemiplegic. Both were operated upon and both died.

CASES X. and XII. are patients operated upon within the past six months and it is too early to make a report upon them. One of them, a child, two and a half years old, idiotic and epileptic, operated on in April by Dr. Powell, now has no fits and is brighter and more docile.

Out of the above 12 cases there were improved, 3; not improved, 5; died, 3; doubtful, 1.

#### *Cases Reported by Other Observers.*

Starr's statistics<sup>1</sup> bring the list of reported cases up to the early part of 1893. He then collected 34 cases, and added two more of his own, making a total of 36. Among them the deaths were 15, or nearly 42 per cent.

Among the remainder there was improvement in 15, and no improvement in 6. Among the improved there was *great improvement* in three. The improvement consisted in diminution of fits and paralysis and increase of mental power.

The reports of improvement were made: 1 year, 1½ years, 3 months, 6 months, 9 months, 2 years, 1 month, 2 years, 1 month, 2 months.

Since the publication of Starr's table, cases have been reported by Dr. Emory Lamphear. (*The Journal of the American Medical Association*, 1894, p. 783.)

CASE I.—Microcephalic idiocy. Harry A., aged four years. Could not talk, idiotic, walked imperfectly, had convulsions frequently, small head. Craniotomy, May 12, 1892, and again, June 18, 1892. Boy improved rapidly. In August could walk and say words. Last report in 1893; still improving; no more convulsions.

<sup>1</sup> Brain Surgery, 1894.

CASE II.—Henry B., aged six years. Congenital idiocy, convulsions. The child was absolutely idiotic, could not walk or talk, or even masticate its food. Craniotomy. Report seven months later: very unexpected and surprising improvement; quieter, eats well, says a few words, fewer convulsions.

CASE III.—Boy, aged twelve years. Epileptic idiocy. The boy was well developed. Epilepsy began at three years and six months, and was mainly hemiplegic. Right side less developed. Craniotomy. No improvement.

CASE IV.—Boy, aged six years. Traumatic epilepsy. Operation; death.

CASE V.—Hydrocephalic idiocy. Lydia W., aged four years and six months. At five months hydrocephalus and convulsions began. Child became completely idiotic. Operation; convulsions disappeared; not much change in mental condition.

CASE VI.—Idiocy. Boy, aged four years and six months. Operation; death.

Dr. Lamphear's conclusions are that the field for craniotomy is a limited one, but in this field some help can be given.

L. Masson, in his work entitled *Des Traumatismes Craniens*, Paris, 1894, goes over the entire literature of the subject and collects many cases from French periodicals which I have not seen referred to elsewhere. I record them in the briefest possible manner.

CASE VII.—Microcephalous idiot. Female, aged three years. Craniotomy; three months later improved; head larger. (J. Ransohoff, *Medical News*, June, 1891.)

CASE VIII.—Microcephalous idiot. Male, aged three years. Operation; one year later marked improvement; head larger. (Corné, *Normandie Medical*, August 15, 1891.)

CASE IX.—Idiocy. Male, eight months. Spastic diplegia, microcephalus, optic neuritis; premature ossification of cranium. Operation; improvement marked and progressive. (Miller, *British Medical Journal*, No. 1647; *Arch. de Neurol.*, vol. xxv.)

CASE X.—Microcephalous and choreic idiot. Male, four years. Operation; improvement reported in three weeks. (Wyman, *Medical Times and Register*, October, 1, 1892.)

CASE XI.—Chemieux (*Congr. für de Chir.*, vi., session 1892). F., four years and two months. Idiocy, microcephalus. Improvement.

CASE XII.—Reboul (*Arch. Prov. de Chirur.*, June, 1893). M., idiocy. Microcephalic contractures, athetosis, etc. Craniotomy; removed a serous cyst in frontal region; death.

CASE XIII.—Bernard Joos (*Corresp. Blatt. für Schw. Aertze*, March 15, 1893). M., aged three years and nine months. Idiocy; microcephalus; two craniotomies; five months later great improvement reported.

CASE XIV.—Largeau, V. (*Cong. für de Chirur.*, 1892). M., 3; microcephalous idiot; great circumference, 45 cm.; operation; slight improvement.

CASE XV.—Blanc (*Ann. de la Société de Saint Etienne*, 1893, t. 11). M., 7½; microcephalus and idiocy; operation; very great improvement reported three years later.

CASE XVI.—Kurz (*Wien. med. Presse*, October 23, 1892). M., thirteen months; idiocy; microcephalus; operation; two months later head measures 1 cm. more in great circumference; improvement.

CASE XVII.—Jaboulay (*Arch. prov. de Chirur.*, February, 1893). M. 13; idiocy; operation; six months later slight improvement; fewer cries.

CASE XVIII.—A. Broca (*Congr. franc. de Chirur.*, 1891). M., 18; imbecile; monoplegia and Jacksonian epilepsy; operation; six months later slight improvement.

Dr. John F. Barbour (*Journal of American Med. Association*, March 30, 1895) tabulates 89 operations; deaths, 16; no improvement, 20; improved, 48; unknown, 5. He reports one case.

CASE XIX.—Infant, with premature closure of fontanelles; idiocy; epilepsy; operation; no improvement reported two years later.

CASE XX.—Dr. Vance in the same number of the *Journal* reports the case of an idiot, aged nine years; operation; death.

CASE XXI.—Dr. F. Dumont reports the following: Infant, fourteen months; microcephalous idiot; naso-occipital arc 23; operation by circular craniotomy; two months later improvement in motility and intelligence. (*Correspond. bl. f. Schw. Aertze*, 1893, No. 23.)

Dr. J. H. Ackermann, of Stockholm, reviews the subject in *Sammlung klin. Vorträge*, Leipzig, 1894, No. 90. He collects fifty-seven cases, not including (as Dr. Barbour does) Lannelongue's.

CASE XXII.—M., aged two years and six months; microcephalous and epileptic idiot; two operations; no improvement.

#### SUMMARY.

|                           | Total. | Improved. | Not improved. | Doubtful. | Died. |
|---------------------------|--------|-----------|---------------|-----------|-------|
| Starr's collection . . .  | 36     | 15        | 6             | ...       | 15    |
| Personal (Dana) . . .     | 12     | 3         | 5             | 1         | 3     |
| Lamphear . . . . .        | 6      | 2         | 2             | ...       | 2     |
| Masson's collection . . . | 12     | 8         | ...           | 3         | 1     |
| Barbour-Vance . . . . .   | 2      | ...       | 1             | ...       | 1     |
| Dumont . . . . .          | 1      | 1         |               |           |       |
| Ackermann . . . . .       | 1      | ...       | 1             |           |       |
|                           | 70     | 29        | 15            | 4         | 22    |

Leaving out the older collections, including Masson's, in which mortality is too high and improvement too frequent, we have the following:

|        |           |               |         |
|--------|-----------|---------------|---------|
| Total. | Improved. | Not improved. | Deaths. |
| 22     | 6         | 10            | 6       |

This represents, in my opinion, fairly well recent results.

The death-rate above given is about one-third, but this, as before



stated, is not a correct representation of the dangers of the operation. When properly done the death-rate should not be over 5 per cent.

*The Pathology of Idiocy and Rationale of Craniotomy.*

The pathological changes in the brain which cause idiocy and imbecility have been frequently described, and need not be dwelt upon here, except so far as concerns the class of cases for which the operation of craniotomy is most indicated.

The changes and corresponding classification made by Bourneville are these :

1. Idiocy from agenesis, or simple defective brain development. These include most of the microcephalic cases.

2. Idiocy from localized atrophies, sclerosis, cysts.

3. Idiocy from tuberous or hyperplastic sclerosis.

4. Idiocy from hydrocephalus.

5. Idiocy from myxœdema.

There is another general classification of idiocy suggested by Dr. H. Piper, which, while not perfectly exact, answers a practical purpose :

1. Idiocy without epilepsy and paralysis (congenital),

2. Idiocy with epilepsy and paralysis (acquired).

Now in a general way it may be said that the simple idiocies without epilepsy and paralysis (as hemiplegia or paraplegia) are prenatal in origin, depend upon hereditary influences, and are oftenest associated with some degree of microcephalous. They correspond to Class 1 of Bourneville.

The idiocies that are associated with fits and palsies are most often due to accidents at the time of birth or to injuries and infectious fevers, leading to cerebral hemorrhages. In these cases the head is usually of average size, or slightly below it.

Following the statistics of H. Piper, Superintendent of the Idiot Asylum of Dalldorff (Berlin, 1893), we find the following facts as to the predisposing causes of idiocy :

In congenital idiocy, the proportion of males to females was two to one; in the acquired form, three to one. In both forms, therefore, the male sex predominates decidedly. Taking the first type of idiocy (congenital), we find the following percentages :

In 23 per cent. there was phthisis in the parents or ascendants; in 14 per cent. there was insanity in the parents or ascendants; in 10 per cent. the father was a drunkard; in 7 per cent. there was epilepsy in one parent; in 5 per cent. there was syphilis in one parent; in 4 per cent., mother nursed the child during pregnancy; in 4 per cent., idiocy in ascendants; in 3 per cent., parents were blood relations; in 2 per cent., accident to the mother.

In the second form (acquired idiocy), the following percentages were noted:

In 27 per cent. the child had suffered from scarlatina, diphtheria, or typhoid fever; in 11 per cent., measles; in 9 per cent., rickets and encephalitis; in 6 per cent., prolonged labor.

In the idiocies of the first class there is sometimes a premature ossification of the cranial bones. This fact, I believe, is well established. The idea that this premature ossification of the cranial bones compresses the brain and prevents its development is entirely untenable, nor has it ever been considered by myself to furnish the indication for the operation; still it is my opinion that this class—the microcephalic idiots without fits or palsies—furnishes the best field for the operation. It is among them that the largest number of improvements have been recorded. My own view of the *rationale* of the operation is that it has a profoundly disciplinary effect upon the idiot. These creatures are often not to be affected at all by ordinary educational methods; neither rewards nor punishments stimulate their effort or excite their attention. They cry, scream, and throw themselves about without the slightest reference to anything that is said to them or done for them. The parents, as a rule, abandon themselves to despair and yield all their attention simply to gratifying the morbid displays of the imbecile child. I have known a mother to carry an idiot child about on her arm the whole day, only putting it down for a short interval for her meals or while the child was sleeping. This she kept up for more than a year, and at the same time did her housework, cooked, and arranged her table and looked after all the requirements of the home. As soon as the child was placed on the floor or in its crib, it inevitably set up a horrible and persistent screaming, which no amount of severe words or rigorous punishment would affect. In other cases the idiots or imbeciles which are found in institutions suffer, perhaps, from too much discipline and not enough personal attention and the lifting influence of bright and healthy children about him or her.

The operation of craniotomy upon children in institutions attracts the attention of the nurses and of the medical officers, and the children get more care and more stimulating words and help in various directions. I would repeat, therefore, that it is in my opinion largely through its pedagogic influence that an improvement in these cases takes place, and that the operation is allied in its effect to a severe piece of castigation. In the very low types of criminals it is a well-recognized fact by philanthropists that discipline and systematic work can only be obtained by actual corporeal punishment in many instances, for nothing else seems actually to appeal to them. In the very lowest grades of intelligence, such as we find in idiots and imbeciles, it is probable that only these very powerful inhibitory influences, such as

accompany the performance of a capital operation, can affect materially the intellect of the child. It is through some such explanation as this that I would explain the fact that a second operation on these children is attended by further good results, and that sometimes the second operation is absolutely necessary before any result is obtained at all.

In addition to this educational or pedagogic effect on idiots, it is not impossible to suppose that by removing certain parts of the skull-cap we do allow for a freer expansion of the brain, that its circulatory supply may be improved and the tendency to growth and development of nerve-centres receive something of a stimulus.

Among fourteen improved cases (later operations) the average age was three and one-third years, and the range of age was nine months to six years.

Microcephalus and idiocy occurred in all, epilepsy in 4, paralysis (diplegia) in 3.

#### *Indications for Operation.*

While I feel that it is still too early to indicate exactly what cases should be operated upon, yet I think that we can lay down some rules with much more confidence than could have been done a few years ago.

1. As to the question of age. It is undoubtedly the fact that very little hope can be expected after a child has reached the age of four or five years, and the best chances for improvement will be obtained if the operation is done under the age of four. Dr. Mies (*Ueber das Hirngewicht des heranwachsenden Menschen*) has shown that the development of the brain is divided into three equal periods. The brain increases in weight by one-third during the first three months of life. It increases in weight another third during the period from the tenth month to about the middle of the third year. The last third increment takes place during the period between two and a half years and adult life, and most of this last increment takes place before the child has reached the age of seven years. It is in the second third of the brain development or the early part of the last third that most improvement is recorded from craniotomy. At the same time there have been some striking successes, so far as symptoms are concerned, in children as old as nine or eleven years, but these are cases in which there have been epilepsy or paralysis or some other motor disturbance. The simple forms of idiocy with microcephalus are certainly not benefited unless operated upon early in life.

2. As to the types of cases in which operation is indicated. As I have already stated, the operation so far shows that it is in the simple forms of idiocy with a moderate amount of microcephalus that most improvement is to be expected. Children who have birth-palsy and decided double paraplegia, and children who have a hemiplegia with epilepsy



dependent on some extravasation of blood and large sclerotic focus in the brain, are rarely helped. It has, however, occurred that even in this latter class of cases improvement has been brought about so far as the epileptic attacks are concerned.

3. Before operating or selecting a patient for operation, the question of cretinism should be carefully considered. If the child is a cretin, that is to say, if the idiocy is due to myxœdema following upon the absence of the thyroid gland, then no operation should be for a moment considered, but the child should be fed upon thyroid extract.

4. The question of hereditary syphilis should be carefully considered, particularly in the first months or year of life, and if there are decided indications of syphilitic exudation or of destructive changes in the brain, vigorous mercurial treatment should be attempted before anything else is undertaken. The idiocy due to a hereditary syphilis, meningitis, or meningo-encephalitis is not likely to be helped by operation if medical therapeutics fail.

5. A good many idiotic children have manifest signs of rickets or tuberculosis. In the case of rickets the operation is not necessarily counterindicated, but the child should receive proper nourishment and medical care before it is attempted. In distinctly tubercular children it would be folly to attempt any surgical interference.

6. As to the question of microcephalus, there seems to be a very great difference in the standard accepted by observers as to what is microcephalus. There is generally a rather small head in these cases of idiocy, but distinct microcephalus is rare. When it exists I doubt if operation does any good, because here there is usually very great lack of brain development. I therefore append to this paper some tables containing measurements of my own, as well as figures collected by Dr. H. D. Chapin, showing the average circumference of the head of the infant or young child at different ages.

Table of normal brain measurements based for first two years on measurements of 98 children, by Dr. H. D. Chapin; last two years on author's measurements. The figures are higher than those given by Lihazik, who makes the great circumference at end of twenty-first month 46 cm., but the above figures are based on measurements of the unshaven scalp. A deduction of 1 cm. for the hair brings it about to German measurements.

|                        | Birth. | 5th to 6th month. | 11th mo. to 1 year. | 18 months to 2 years.   | 3d year.               | 4th year.              |
|------------------------|--------|-------------------|---------------------|-------------------------|------------------------|------------------------|
| Great circumference,   | 34.72  | 38.94             | 44.91               | 47.41<br>(Idiots, 46.3) | 49.0<br>(Idiots, 47.2) | 49.5<br>(Idiots, 47.2) |
| Naso-occipital arc,    | 22.33  | 26.05             | 30.41               | 32.83                   |                        |                        |
| Naso-bregmatic arc,    | 9.22   | 9.83              | 12.14               | 13.16                   |                        |                        |
| Bregmato-lambdoid arc, | 8.94   | 10.16             | 11.33               | 11.41                   |                        |                        |

SUMMARY. Those who have read the foregoing will see that I hold the operation of craniotomy for idiocy to be still justifiable in a certain selected class of cases. I show that by perfected methods of operating the danger to life is under 5 per cent., and will probably become still less. The clinical reports quoted show improvement after operation too often for the facts to be ignored, even allowing for the happy therapeutic temperament of the operating surgeon; and in my personal experience one-half of the recovered cases have been improved.

The method by which improvement is brought about is largely a surgico-pedagogic one. All those who have had experience in educating idiots lay stress on the importance of special pedagogics, and craniotomy belongs, in a measure, to this class of therapeutic procedure. It may have some additional value by stimulating the circulation and nutritional activity of the brain.

The cases in which the operation is indicated are generally those of cerebral agenesis, rather than those having extensive sclerotic lesions and palsies. The operation may sometimes be repeated with benefit; and the results are not always immediate, especially so far as the cessation of the fits is concerned.

50 W. FORTY-SIXTH ST., NEW YORK.

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## THE INFLUENCE OF ALCOHOL AND ALCOHOLIC DRINKS UPON THE CHEMICAL PROCESSES OF DIGESTION.<sup>1</sup>

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IN considering the influence of alcohol and alcoholic drinks upon digestion we must have, at the outset, a clear understanding of what is meant by or included under the term digestion. Primarily, the object of digestion is to convert the insoluble and non-diffusible foodstuffs into forms capable of being absorbed. This is accomplished mainly through the agency of certain ferments or enzymes contained in the several digestive fluids, viz., the saliva, gastric juice, and pancreatic juice. The first of these fluids, secreted by three pairs of glands (salivary glands) which pour their secretions into the mouth, acts solely on starchy, farinaceous, or carbohydrate foods, transforming them into soluble dextrans

<sup>1</sup> A report presented to the "Committee of Fifty for the Investigation of the Liquor Problem," at a meeting held in New York, May 3, 1895.

and sugar—a process which commences in the mouth and continues for a short time in the stomach until the ferment of the saliva is finally destroyed by the increasing acidity of the gastric juice. The gastric juice, on the other hand, secreted by the tiny cells lining or composing the mucous membrane of the stomach, acts solely upon the proteid or albuminous foods, transforming them into a number of products characterized especially by their solubility and diffusibility. When the acid chyme leaves the stomach it passes through the pylorus into the small intestine, where it is exposed to the double action of the bile and pancreatic juice, the latter a powerful digestive fluid containing three distinct ferments. One of these ferments, an amylolytic enzyme, is apparently identical with the ferment of the saliva, and, like the latter, converts any unchanged starch into soluble dextrins and sugar. The second ferment is a powerful proteolytic enzyme called trypsin, which, in a neutral or alkaline solution, changes proteid matter into a row of soluble and diffusible products somewhat different in nature from those formed in acid gastric digestion. The third ferment is an adipolytic or fat-splitting ferment, which apparently transforms at least a portion of the fats of the food into soluble forms. This threefold action of the pancreatic juice may continue for some time in the small intestine, but as the peristaltic or wave-like contraction of the intestinal walls tends to push the contents of the tube onward toward the large intestine, and as absorption is quite rapid at this point, the conditions gradually become unfavorable for digestive action. The fluid and soluble matter is gradually absorbed into the blood and chyle, the contents of the intestine thereby becoming more or less viscous and compact, while the onset of fermentative and putrefactive changes gives rise to an acid reaction, all of which is inimical to the continuation of pancreatic digestion.

This briefly represents, in a general way, the character of the changes induced by the several digestive juices—chemical changes in the character of the various foodstuffs induced by the several digestive ferments or enzymes, and which are absolutely essential for the advantageous utilization of the food by the body. It is quite evident, however, that the rate and extent of digestion may be modified by a variety of circumstances, and these are by no means limited to the action of the respective ferments or enzymes. Thus, the process of secretion in a given set of glands may be so modified that the yield of digestive fluid is greatly reduced, thus diminishing the amount of fluid available for digestion; or the secretion may be so modified in composition that it is less adapted for carrying out its normal function. On the other hand, there may be an increased secretion of the digestive fluid by which digestion is accelerated through the mere increase in volume of the active fluid, or the strength of the secretion may be increased, thus leading to more vigorous digestive action. Such changes may be induced by an influence exerted through



the nervous system, for, as is well known, secretion is more or less controlled, both as regards the quantity and composition of the fluid, by certain nerve-fibres; and thus an agent may have an important influence upon digestion through its influence upon certain parts of the nervous system, by which the activity of the secreting gland is controlled and modified, and this quite independent of any specific action the agent may exert, by its mere presence, upon the chemical or solvent action of the secretion or its contained ferment.

Again, as is well known, excessive accumulation of the products of digestion tends to retard or even check the rate of digestion through an inhibitory influence upon the activity of the ferment, hence modifications in the rate of absorption have a direct influence upon the digestive process. Consequently, an agent which by its mere presence in the stomach-contents, for example, is without direct action on the ferment, or even without influence when absorbed into the blood on the process of secretion, may indirectly influence digestion by either retarding or accelerating absorption. Further, the mechanical movements of the gastro-intestinal tube, *i. e.*, peristalsis, have their influence upon digestion, solution of the proteid foods especially being facilitated by the vigorous churning to which the contents of the stomach and intestine are subjected under normal circumstances. The onward movement of the contents of the alimentary tract is likewise governed by the proper contraction of the longitudinal and circular muscle-fibres of the intestine, and as all of these muscles, both of the stomach and intestine, are controlled by the nervous system, it follows that digestion may be somewhat modified through this channel, indirectly to be sure, but to quite an appreciable extent. Hence certain agents, acting primarily upon the nervous system, may indirectly in this manner have an influence upon digestion without showing any special action upon the digestive enzymes, or upon the process of secretion or absorption.

From these brief statements it is evident that what we term digestion is a complicated chemico-physiological process involving not only the simple solvent or digestive action of the several digestive juices, or of their contained ferments or enzymes, but dependent in no small degree for its successful working upon the kindred processes of secretion, absorption, etc. Hence, in attempting any accurate and complete study of the influence of alcohol and alcoholic fluids upon digestion, there must be a clear recognition of the fact that no single line of experimentation can lead to full and concise results covering the whole ground of inquiry. For experimental purposes, therefore, the subject must be studied under several distinct heads, as (1) the influence of alcohol and alcoholic drinks upon the process of secretion; (2) upon the process of absorption; (3) upon peristalsis; and (4) upon the purely chemical processes of digestion. It is the latter phase of the subject which has been our study

during the past year, and the report which we now offer covers simply the influence of alcohol and a variety of alcoholic drinks upon the digestive action of the several digestive fluids and their contained ferments or enzymes. Such a study cannot properly be carried out on animals nor on human beings, since it would then be almost impossible to connect the results obtained with their true cause. We must at first exclude all of the accessory influences connected with secretion, absorption, and peristalsis if we are to learn the influence of alcoholic drinks upon digestive action, and this is best done by artificial digestive experiments in which saliva, gastric juice, and pancreatic juice are allowed to act under definite and constant conditions upon the several foodstuffs, and any variations in activity carefully determined. In this way, and in this way only, in our opinion, is it possible to measure the exact influence of alcohol and alcoholic fluids upon digestive action; *i. e.*, upon the purely chemical processes of digestion.

Before proceeding further, we would call attention to the fact that in writing this report we have confined ourselves mainly to a mere statement of the results obtained in our work, with the obvious conclusions to be drawn therefrom. In only a few instances have we attempted any comparison with the results obtained by other workers in this direction, and, as a rule, we have refrained from generalizations other than those plainly warranted by the data which we ourselves have obtained. At the end of our report we have appended a short bibliography giving the more important papers by previous workers.

#### GASTRIC DIGESTION (*i. e.*, PROTEOLYSIS BY PEPSIN-HYDROCHLORIC ACID).

The solvent action of the gastric juice on proteid or albuminous foods is due solely to the presence of pepsin-hydrochloric acid, but the amount of both pepsin and acid in the natural secretion varies considerably with different states of the system. The average amount of hydrochloric acid, however, is approximately 0.2 per cent, while to the pepsin no definite figure can be given, since as yet the chemist has not been able to isolate the ferment in a pure state. Further, it is quite certain that both ferment and acid are subject to great variation in the amount present in the secretion at different stages of digestion and under different conditions of health and nutrition. In view of these facts we have experimented under varying conditions in order that our results may have as wide an application as possible.

The methods pursued were as follows:

(a) *With fluid egg-albumin.*<sup>1</sup> The albumin solution was prepared

<sup>1</sup> See R. H. Chittenden: "Observations on the Digestive Ferments;" Medical News, Philadelphia, February 16, 1889.

after the method recommended by Schütz.<sup>1</sup> A quantity of undiluted white of egg was freed from globulin by the addition of hydrochloric acid of specific gravity 1.12 (4.2 c.c. acid to 300 c.c. of albumin), the mixture shaken vigorously, and after standing some hours filtered through paper. The clear acid fluid was then made exactly neutral with dilute sodium carbonate, after which it is ready for use. Ten c.c. of this fluid contain a little less than 1 gram of coagulable proteid, the exact amount being determined by heat-precipitation, collecting the coagulum on a weighed filter and drying at 110° C.

The digestive experiments were made in series, each individual mixture containing the same volume of the prepared albumin solution (10–20 c.c.), together with the same amount of pepsin and acid. The albumin solution was introduced into a small flask of 200 c.c. capacity provided with a suitable stopper, water and alcohol or alcoholic fluid being added to make the volume up to 50 c.c.

Lastly, 50 c.c. of 0.4 per cent. hydrochloric acid, containing a known amount of pepsin, were added, making the total volume of each mixture 100 c.c., and the strength of acid 0.2 per cent. HCl. It is thus evident that the only variable element in the mixtures of a given series is the amount of alcohol or alcoholic fluid present. The flasks were then placed in a water-bath, kept approximately at the body temperature (38–40° C.) for a definite period—usually five to seven hours. At the end of the allotted time, the extent of digestive action was determined by simply heating the mixtures to boiling, neutralizing the acid fluid by addition of an equivalent amount of sodium carbonate in a 1 per cent. solution, and collecting the precipitate of unaltered albumin or acid-albumin on a weighed filter, washing it with boiling water until free from chlorides, and then drying at 110° C. until of constant weight. The difference between the weight of coagulable albumin introduced and the amount found at the end of the experiment gives the amount of soluble digestive products, *i. e.*, albumoses and peptones, formed under the conditions of the experiment. In this way it is possible to measure accurately the extent of proteolytic action under varying conditions.

(*b*) *With coagulated blood-fibrin.* Fresh blood-fibrin from the blood of oxen or sheep was washed with water until quite white, then boiled repeatedly with water, after which it was thoroughly extracted with cold alcohol, boiling alcohol, and, lastly, with ether. It was then ground to a coarse powder and passed through a sieve, so constructed that the particles collected were all approximately of the same size. The so-prepared powder was then dried at 110° C. until of constant weight.

The digestive experiments with this form of proteid matter were conducted as follows: A definite amount of alcohol or alcoholic fluid was



introduced into each flask, water being added to make the volume 50 c.c. Then 50 c.c. of 0.4 per cent. hydrochloric acid containing a known amount of pepsin were added, thus making the total volume of fluid 100 c.c. To this mixture two grams of the prepared fibrin were added. Thus, as in the experiments with fluid egg-albumin, all of the mixtures of a given series were exactly alike in containing the same volume of 0.2 per cent. hydrochloric acid, the same amount of pepsin, etc., but unlike in the percentage of alcohol or alcoholic fluid present. For comparison, one mixture of each series contained no alcohol whatever. When prepared, the mixtures of a given series were placed in a bath at 38°–40° C. for two to three hours, where they were kept under exactly the same conditions, being stirred or shaken to the same extent, etc. At the end of the given period the mixtures were heated to boiling to destroy the ferment, after which the undigested residue was collected on a weighed filter, washed with boiling water until free from all soluble matter, then dried at 110° C. until of constant weight. The difference between the weight of the fibrin taken and the undissolved residue is a true measure of the digestive action under the conditions of the experiment.

#### ACTION OF ABSOLUTE ALCOHOL (99.5–100 PER CENT.).

The percentages of alcohol referred to are percentages by volume unless otherwise specified. The pepsin employed was a very active scale pepsin marked 1 : 4000.

##### *Experiment 1.*

Conditions:

Proteid = fluid egg-albumin (20 c.c.).

20 c.c. albumin solution contain 1.6398 grams dry albumin.

0.03 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $6\frac{1}{2}$  hours at 38°–40° C.

| Alcohol.    | Undigested<br>albumin. | Proteid<br>digested. | Relative proteolytic<br>action. <sup>1</sup> |
|-------------|------------------------|----------------------|----------------------------------------------|
| 0 per cent. | 0.1850 gram.           | 88.8 per cent.       | 100.0                                        |
| 6 “         | 0.2708 “               | 83.5 “               | 94.0                                         |
| 12 “        | 0.5473 “               | 66.7 “               | 76.0                                         |
| 18 “        | 0.6703 “               | 59.2 “               | 66.6                                         |

##### *Experiment 2.*

Conditions:

Proteid = fluid egg-albumin (15 c.c.).

15 c.c. albumin solution contain 1.0522 grams dry albumin.

0.0024 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $5\frac{1}{2}$  hours at 38°–40° C.

<sup>1</sup> Expressing the relative extent of digestive action as compared with the action of the control-experiment, the latter being taken as 100.

| Alcohol.    | Undigested albumin. | Proteid digested. | Relative proteolytic action. |
|-------------|---------------------|-------------------|------------------------------|
| 0 per cent. | 0.4007 gram.        | 62.0 per cent.    | 100.0                        |
| 1 "         | 0.4075 "            | 61.3 "            | 98.8                         |
| 3 "         | 0.5146 "            | 51.1 "            | 82.4                         |
| 6 "         | 0.6256 "            | 40.6 "            | 65.4                         |

*Experiment 3.*

Conditions:

Proteid = fluid egg-albumin (10 c.c.).

10 c.c. albumin solution contain 0.8199 gram dry albumin.

0.03 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $5\frac{1}{2}$  hours at  $38^{\circ}$ – $40^{\circ}$  C.

| Alcohol.    | Undigested albumin. | Proteid digested. | Relative proteolytic action. |
|-------------|---------------------|-------------------|------------------------------|
| 0 per cent. | trace               | 100.0 per cent.   | 100.0                        |
| 1 "         | 0.0100 gram.        | 98.8 "            | 98.8                         |
| 3 "         | 0.0130 "            | 98.5 "            | 98.5                         |
| 5 "         | 0.0250 "            | 97.0 "            | 97.0                         |
| 8 "         | 0.0699 "            | 91.5 "            | 91.5                         |
| 10 "        | 0.0875 "            | 89.4 "            | 89.4                         |

*Experiment 4.*

Conditions:

Proteid = fluid egg-albumin (20 c.c.).

20 c.c. albumin solution contain 1.9198 grams dry albumin.

0.05 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $5\frac{1}{2}$  hours at  $38^{\circ}$ – $40^{\circ}$  C.

| Alcohol.    | Undigested albumin. | Proteid digested. | Relative proteolytic action. |
|-------------|---------------------|-------------------|------------------------------|
| 0 per cent. | 0.0887 gram.        | 95.4 per cent.    | 100.0                        |
| 1 "         | 0.0740 "            | 96.1 "            | 100.8                        |
| 5 "         | 0.2617 "            | 86.4 "            | 90.5                         |
| 10 "        | 0.5373 "            | 72.0 "            | 75.5                         |
| 15 "        | 0.5859 "            | 69.5 "            | 72.8                         |

*Experiment 5.*

Conditions:

Proteid = blood-fibrin (2 grams).

0.016 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $2\frac{1}{4}$  hours at  $38^{\circ}$ – $40^{\circ}$  C.

| Alcohol.    | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------|--------------------|-------------------|------------------------------|
| 0 per cent. | 0.5834 gram.       | 70.9 per cent.    | 100.0                        |
| 1 "         | 0.5727 "           | 71.4 "            | 100.7                        |
| 3 "         | 0.6273 "           | 68.7 "            | 96.8                         |
| 5 "         | 0.6493 "           | 67.6 "            | 95.3                         |

The following five series of experiments were all made after the same plan, each mixture containing 2 grams of blood-fibrin, 0.016 gram pepsin in 0.2 per cent. hydrochloric acid, and warmed at  $38^{\circ}$ – $40^{\circ}$  C. for  $2\frac{1}{4}$  hours:

*Experiment 6.*

| Alcohol.    | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|-------------|-----------------------|----------------------|---------------------------------|
| 0 per cent. | 0.3676 gram.          | 81.7 per cent.       | 100.0                           |
| 10 "        | 0.5970 <sup>1</sup> " | 70.2 "               | 85.9                            |

*Experiment 7.*

| Alcohol.    | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|-------------|-----------------------|----------------------|---------------------------------|
| 0 per cent. | 0.2013 gram.          | 90.0 per cent.       | 100.0                           |
| 5 "         | 0.2601 "              | 87.0 "               | 96.6                            |

*Experiment 8.*

| Alcohol.    | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|-------------|-----------------------|----------------------|---------------------------------|
| 0 per cent. | 0.1759 gram.          | 91.3 per cent.       | 100.0                           |
| 5 "         | 0.2145 "              | 89.3 "               | 97.8                            |

*Experiment 9.*

| Alcohol.    | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|-------------|-----------------------|----------------------|---------------------------------|
| 0 per cent. | 0.2027 gram.          | 89.9 per cent.       | 100.0                           |
| 5 "         | 0.2619 "              | 87.0 "               | 96.7                            |

*Experiment 10.*

| Alcohol.    | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|-------------|-----------------------|----------------------|---------------------------------|
| 0 per cent. | 0.3881 gram.          | 80.6 per cent.       | 100.0                           |
| 4 "         | 0.4118 "              | 79.5 "               | 98.6                            |

In the following three experiments the conditions were the same as in the preceding, excepting that the mixtures were warmed at 38°–40° C. for 2 hours instead of 24 hours:

*Experiment 11.*

| Alcohol.    | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|-------------|-----------------------|----------------------|---------------------------------|
| 0 per cent. | 0.5315 gram.          | 73.5 per cent.       | 100.0                           |
| 2 "         | 0.5390 "              | 73.1 "               | 99.4                            |

*Experiment 12.*

| Alcohol.    | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|-------------|-----------------------|----------------------|---------------------------------|
| 0 per cent. | 0.4630 gram.          | 76.9 per cent.       | 100.0                           |
| 2 "         | 0.4583 "              | 77.1 "               | 100.2                           |

*Experiment 13.*

| Alcohol.    | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|-------------|-----------------------|----------------------|---------------------------------|
| 0 per cent. | 0.1970 gram.          | 90.2 per cent.       | 100.0                           |
| 5 "         | 0.2830 "              | 85.9 "               | 95.2                            |

<sup>1</sup> Filtered very slowly and could not be washed thoroughly, hence the result is only approximately correct.



In the following three experiments the conditions were the same as in the preceding, except that the mixtures were warmed at 38°–40° C. for 1 $\frac{3}{4}$  hours:

*Experiment 14.*

| Alcohol.    | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------|--------------------|-------------------|------------------------------|
| 0 per cent. | 0.5068 gram.       | 74.7 per cent.    | 100.0                        |
| 2 “         | 0.4970 “           | 75.2 “            | 100.6                        |

*Experiment 15.*

| Alcohol.    | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------|--------------------|-------------------|------------------------------|
| 0 per cent. | 0.2032 gram.       | 89.9 per cent.    | 100.0                        |
| 5 “         | 0.2317 “           | 88.5 “            | 98.4                         |

*Experiment 16.*

| Alcohol.    | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------|--------------------|-------------------|------------------------------|
| 0 per cent. | 0.3247 gram.       | 83.8 per cent.    | 100.0                        |
| 5 “         | 0.3554 “           | 82.3 “            | 98.2                         |

In the following two experiments the mixtures were warmed at 38°–40° C. for 1 $\frac{1}{2}$  hours:

*Experiment 17.*

| Alcohol.    | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------|--------------------|-------------------|------------------------------|
| 0 per cent. | 0.3361 gram.       | 83.2 per cent.    | 100.0                        |
| 5 “         | 0.4040 “           | 79.8 “            | 95.9                         |

*Experiment 18.*

| Alcohol.    | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------|--------------------|-------------------|------------------------------|
| 0 per cent. | 0.3867 gram.       | 80.7 per cent.    | 100.0                        |
| 5 “         | 0.4352 “           | 78.3 “            | 97.0                         |

In the following experiment the conditions were apparently much the same as in the preceding experiments, although the results show a greater degree of retardation with like percentages of alcohol:

*Experiment 19.*

Conditions:

Proteid = blood-fibrin (2 grams).

0.02 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion 2 $\frac{1}{4}$  hours at 38°–40° C.

| Alcohol.    | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------|--------------------|-------------------|------------------------------|
| 0 per cent. | 0.4536 gram.       | 77.32 per cent.   | 100.0                        |
| 0.5 “       | 0.4688 “           | 76.56 “           | 99.0                         |
| 1.0 “       | 0.4954 “           | 75.23 “           | 97.2                         |
| 2.0 “       | 0.4958 “           | 75.21 “           | 97.2                         |
| 3.0 “       | 0.5324 “           | 73.33 “           | 94.9                         |
| 5.0 “       | 0.6031 “           | 69.84 “           | 90.3                         |

A careful study of all of the preceding results makes it evident that we cannot define with mathematical exactness the action of a given percentage of absolute alcohol on pepsin-proteolysis, since variations in the attendant conditions, *i. e.*, the relative amounts of pepsin, acid, and proteid, together with the period of digestion, the digestibility of the particular proteid, etc., are prone to modify the final result. Thus, with a weak gastric juice, where the amount of ferment present is small and digestive action consequently slow, or where the proteid material used is difficult of digestion, the retarding effect of a given percentage of alcohol is far greater than when the digestive fluid is more active; that is, when it contains more pepsin. (Contrast Experiments 1, 2, and 3.) Further, this difference of action is more pronounced the larger the percentage of alcohol present. Thus, in Experiments 2 and 3, where the difference in the amount of pepsin present is very great, the action of 1 per cent. of absolute alcohol is essentially the same; but when the amount of alcohol is raised to 3, 5, or 6 per cent. then the difference in digestive action is very striking.

Bearing in mind the possibility of these variations incidental to variations in the attendant conditions, and recognizing the possibility and probability of just such variations in the human stomach, we may look at our results with a view to drawing some general conclusions. First, it is plainly manifest that in the presence of small amounts of alcohol (1-2 per cent. of absolute alcohol) gastric digestion may proceed as well or even better than under normal circumstances. In fact, many of our experiments show a slight increase in digestive power when the mixture contains 1 or 2 per cent. of absolute alcohol. This increased digestive action, though slight, occurs too frequently to be the result of mere accident, and apparently indicates a tendency for alcohol, when present in small quantity, to increase slightly the digestive action of pepsin-hydrochloric acid; or, in other words, to so stimulate the ferment that it can accomplish somewhat more, under given conditions, than it otherwise could do. As the percentage of alcohol is raised, retardation or inhibition becomes more noticeable, although ordinarily it is not very pronounced until the digestive mixture contains 5-10 per cent. or more of absolute alcohol. With 15-18 per cent. of absolute alcohol, digestive action may be reduced one quarter or even one-third, the exact amount of retardation, however, being especially dependent upon the strength or activity of the gastric juice and upon the natural digestibility of the proteid material. (See Experiments 1, 3, 4, and 6.) It is to be remembered, however, that 18 per cent. of absolute alcohol would be equivalent to 36 per cent. of proof-spirit, so that if we should assume the contents of a human stomach at a given period to be one-third proof-spirit, it might perhaps be considered that digestive action would be retarded to the extent of 25-35 per cent., provided the gastric juice present in the

stomach was of fair strength and the proteid matter of ordinary digestibility. Such percentages of proof-spirit, however, are not likely to be long present in the stomach, and it is perhaps idle to speculate on such hypothetical cases. We may in this connection, however, again emphasize the fact that the stronger the gastric juice and the more digestible the proteid food undergoing digestion the less retardation will a given percentage of alcohol produce, while, on the other hand, the weaker the gastric juice and the more indigestible the proteid the greater will be the inhibition caused by a given percentage of alcohol. In other words, those variations which must naturally exist in the stomach-contents of different individuals, both in health and disease, will lead to different degrees of retardation in the presence of given percentages of absolute alcohol. It would, therefore, be unwise to make a general specific statement regarding the action of a given percentage of alcohol. Under definite conditions, however, as our experiments plainly show, the presence of a definite amount of alcohol always leads to essentially the same results.

In order to prevent any misinterpretation of our results, we would again call attention to the fact that we are dealing here with only one of the four questions that need to be answered before we can hope to fully understand the influence of alcohol on gastric digestion as a whole. Thus, our results afford plain evidence of the influence of alcohol on the digestive or solvent power of the gastric juice, but we should not be justified in arguing that exactly the same results would follow from the introduction of alcohol into the living stomach. The action of a given percentage of alcohol on proteolysis alone would be essentially the same in the stomach as in a beaker, provided the alcohol was not absorbed into the blood and thus removed from contact with the digestive mixture, and provided it did not exert any influence on the character of the gastric juice secreted. But it is easily conceivable that a percentage of alcohol which does not interfere with solution of the proteid foodstuffs may so modify the amount or character of the secretion that digestion might be greatly stimulated or greatly retarded. Further, as already stated, the presence of alcohol in the stomach may so affect absorption and peristalsis that the rate of digestion may be modified from this cause; hence, the results above recorded are to be used only in drawing conclusions as to the effect of various percentages of alcohol on the purely chemical process of gastric digestion, *i. e.*, on pepsin-proteolysis.

With reference to these other questions which have such an important bearing on gastric digestion we must await the appearance of more complete experimental data for their solution, and not until then can we explain fully the action of alcohol on digestion in the broad sense indicated.

In conclusion, it is to be noted that our results are more or less in



accord with what has been previously published concerning the action of alcohol on gastric digestion. Thus, Bikfalvi<sup>1</sup> found in artificial digestive experiments that alcohol, even in small quantities, retards normal gastric digestion. Klikowicz<sup>2</sup> found that the presence of 5 per cent. of alcohol in the digestion of egg- and serum-albumin led to somewhat variable results, although, as a rule, there was an indication of a slight stimulation of proteolytic action. In the presence of 10 per cent. of alcohol there was always marked retardation, while 15, 20, and 30 per cent. of alcohol checked digestion to a marked degree.

Roberts found by artificial digestion-experiments that in the presence of less than 10 per cent. of proof-spirit there was no appreciable retardation. With 10 per cent. retardation was only barely detectable. With 20 per cent. there was quite distinct, but still only a slight, retardation. Above this point, however, the inhibitory effect of alcohol increased rapidly.<sup>3</sup>

That the action of a digestive ferment may be both stimulated and retarded by the same substance, according to the quantity present, has been already demonstrated;<sup>4</sup> hence there is no inconsistency in the above results with alcohol. The same action has likewise been observed with yeast-cells.<sup>5</sup>

#### ACTION OF WHISKEY.

Pure whiskey, as is well known, is simply "a diluted alcohol with a peculiar flavor or aroma, due to the raw material employed in its manufacture, and developed during the fermentation, distillation, and ageing of the liquor."<sup>6</sup>

Analysis of a large number of samples of whiskey made under the direction of the New York State Board of Health<sup>7</sup> has shown that adulteration is limited mainly to the addition of water and coloring matter, while such deleterious substances as fusel oils may be present in liquors which have not been properly rectified. Thus, the percentage of alcohol was found to vary from 28.9 per cent. by volume to 60.3 per cent. By far the larger number of samples analyzed showed a content of alcohol ranging from 35 to 40 per cent. by volume.

Our work on the influence of whiskey on gastric digestion was commenced by studying the influence of a medium quality of rye whiskey (Mount Vernon pure rye whiskey, \$1 per quart), analysis of which gave the following results:

<sup>1</sup> Jahresbericht für Thierchemie, xv. p. 273.

<sup>2</sup> Virchow's Archiv, Band 102, p. 376.

<sup>3</sup> Digestion and Diet, p. 132.

<sup>4</sup> Chittenden: Studies in Physiological Chemistry. Yale Univer. Vol. i. p. 76; also vol. 3, p. 60. Dubs: Virchow's Archiv, Band 134, pp. 519-540.

<sup>5</sup> Schultz: Pflüger's Archiv, Band 42, p. 517. Biernacki: Jahresbericht für Thierchemie, 17, p. 477.

<sup>6</sup> Second Annual Report of the New York State Board of Health, p. 642.

<sup>7</sup> Loc. cit., p. 647-648.

|                                  |                              |
|----------------------------------|------------------------------|
| Specific gravity . . . . .       | 0.937 at 17.5° C.            |
| Alcohol, by volume . . . . .     | 50-51 per cent. <sup>1</sup> |
| Solid residue at 110° C. . . . . | 0.3284 gram per 100 c.c.     |
| Ash . . . . .                    | 0.0040 " " "                 |
| Reaction acid.                   |                              |

*Experiment 20.*

## Conditions :

Proteid = fluid egg-albumin (10 c.c.).  
 10 c.c. albumin solution contain 0.8146 gram dry albumin.  
 0.03 gram pepsin ; 0.2 per cent. hydrochloric acid.  
 Period of digestion 4½ hours at 38°-40° C.

| Whiskey.    | Undigested albumin. | Proteid digested. | Relative proteolytic action. |
|-------------|---------------------|-------------------|------------------------------|
| 0 per cent. | 0.0182 gram.        | 97.8 per cent.    | 100.0                        |
| 3 "         | 0.0176 "            | 97.9 "            | 100.1                        |
| 5 "         | 0.0288 "            | 96.6 "            | 98.7                         |
| 8 "         | 0.0284 "            | 96.6 "            | 98.7                         |
| 10 "        | 0.0384 "            | 95.3 "            | 97.4                         |

*Experiment 21.*

## Conditions :

Proteid = fluid egg-albumin (10 c.c.).  
 10 c.c. albumin solution contain 0.8146 gram dry albumin.  
 0.012 gram pepsin ; 0.2 per cent. hydrochloric acid.  
 Period of digestion 6 hours at 38°-40° C.

| Whiskey.    | Undigested albumin. | Proteid digested. | Relative proteolytic action. |
|-------------|---------------------|-------------------|------------------------------|
| 0 per cent. | 0.0270 gram.        | 96.7 per cent.    | 100.0                        |
| 1 "         | 0.0231 "            | 97.2 "            | 100.5                        |
| 3 "         | 0.0333 "            | 96.0 "            | 99.2                         |
| 5 "         | 0.0395 "            | 95.2 "            | 98.4                         |
| 8 "         | 0.0616 "            | 92.5 "            | 95.6                         |
| 10 "        | 0.0774 "            | 90.5 "            | 93.5                         |

*Experiment 22.*

## Conditions :

Proteid = fluid egg-albumin (15 c.c.).  
 15 c.c. albumin solution contain 1.0522 grams dry albumin.  
 0.0024 gram pepsin ; 0.2 per cent. hydrochloric acid.  
 Period of digestion 5½ hours at 38°-40° C.

| Whiskey.          | Undigested albumin. | Proteid digested. | Relative proteolytic action. |
|-------------------|---------------------|-------------------|------------------------------|
| 0 per cent.       | 0.4007 gram.        | 62.0 per cent.    | 100.0                        |
| 1 "               | 0.4263 "            | 59.5 "            | 95.9                         |
| 3 "               | 0.4545 "            | 56.9 "            | 91.7                         |
| 6 "               | 0.5372 "            | 49.0 "            | 79.0                         |
| Absolute alcohol. |                     |                   |                              |
| 3 "               | 0.5146 "            | 51.1 "            | 82.4                         |

<sup>1</sup> Varying somewhat in different samples.

*Experiment 23.*

Conditions :

Proteid = blood-fibrin (2 grams).

0.016 gram pepsin ; 0.2 per cent. hydrochloric acid.

Period of digestion  $2\frac{5}{8}$  hours at  $38^{\circ}$ – $40^{\circ}$  C.

| Whiskey.    | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------|--------------------|-------------------|------------------------------|
| 0 per cent. | 0.3401 gram.       | 83.0 per cent.    | 100.0                        |
| 1    "      | 0.3357   "         | 83.3   "          | 100.3                        |
| 3    "      | 0.3401   "         | 83.0   "          | 100.0                        |
| 6    "      | 0.3678   "         | 81.7   "          | 98.4                         |

*Experiment 24.*

Conditions the same as in the preceding experiment :

| Fluid added.            | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------------------|--------------------|-------------------|------------------------------|
| 0 per cent.             | 0.2013 gram.       | 90.0 per cent.    | 100.0                        |
| 5   "   absol. alcohol. | 0.2601   "         | 87.0   "          | 96.6                         |
| 5   "   whiskey         | 0.2312   "         | 88.5   "          | 98.3                         |

In the following experiment six different samples of whiskey were employed, several of which were known to contain only 40 per cent. of alcohol, and their action contrasted with half the percentage of absolute alcohol :

*Experiment 25.*

Conditions :

Proteid = blood-fibrin (2 grams).

0.009 gram pepsin ; 0.2 per cent. hydrochloric acid.

Period of digestion  $1\frac{1}{2}$  hours at  $38^{\circ}$ – $40^{\circ}$  C.

| Whiskey.          | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------------|--------------------|-------------------|------------------------------|
| 0 per cent.       | 0.6701 gram.       | 66.5 per cent.    | 100.0                        |
| 20   "            | 0.9659   "         | 51.8   "          | 77.8                         |
| 20   "            | 0.9849   "         | 50.8   "          | 76.3                         |
| 20   "            | 1.0378   "         | 48.2   "          | 72.4                         |
| 20   "            | 1.0156   "         | 49.3   "          | 74.1                         |
| 20   "            | 1.0390   "         | 48.1   "          | 72.3                         |
| 20   "            | 1.0735   "         | 46.4   "          | 69.7                         |
| Absolute alcohol. |                    |                   |                              |
| 10 per cent.      | 1.0673   "         | 46.7   "          | 70.2                         |

It is thus evident from these experiments that when digestive action is fairly vigorous, as in the presence of moderate amounts of pepsin (Experiments 20, 21, and 23), small percentages of whiskey have no retarding action whatever upon gastric digestion ; indeed, there is even a slight suggestion of increased digestive action in the presence of 1–3 per cent. of whiskey, much the same as was observed in the experiments with absolute alcohol. In the presence of 20 per cent. of whiskey digestive activity may be reduced one-fourth. Further, the retardation



which is produced by larger percentages of whiskey is approximately equal to the retarding action caused by half these percentages of absolute alcohol. In other words, the results would seemingly point to the contained alcohol as the main cause of the inhibition produced by the whiskey. In Experiment 22 we again have evidence of the greater retarding effect of both whiskey and alcohol when the gastric juice is weak, owing to the presence of a small amount of pepsin.

In order to determine more definitely the exact cause of the inhibitory action of whiskey on gastric digestion the following experiments were tried:

*Experiment 26.*

Conditions:

Proteid = fluid egg-albumin (15 c.c.).

15 c.c. albumin solution contain 1.0522 grams dry albumin.

0.0024 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $5\frac{3}{4}$  hours at  $38^{\circ}$ – $40^{\circ}$  C.

| Whiskey.                      | Undigested albumin. | Proteid digested. | Relative proteolytic action. |
|-------------------------------|---------------------|-------------------|------------------------------|
| 0 per cent.                   | 0.5065 gram.        | 51.9 per cent.    | 100.0                        |
| 1 "                           | 0.5268 "            | 50.0 "            | 96.3                         |
| 3 "                           | 0.5496 "            | 47.8 "            | 92.1                         |
| 6 "                           | 0.6069 "            | 42.4 "            | 81.6                         |
| Whiskey residue. <sup>1</sup> |                     |                   |                              |
| 1 per cent.                   | 0.5105 "            | 51.5 "            | 99.2                         |
| 6 "                           | 0.4719 "            | 55.2 "            | 106.3                        |

*Experiment 27.*

Conditions the same as in Experiment 25, except that the 15 c.c. of albumin solution contained 1.2219 grams of dry albumin, and the period of digestion was  $4\frac{1}{2}$  hours:

| Whiskey.         | Undigested albumin. | Proteid digested. | Relative proteolytic action. |
|------------------|---------------------|-------------------|------------------------------|
| 0 per cent.      | 0.5552 gram.        | 54.6 per cent.    | 100.0                        |
| 1 "              | 0.6239 "            | 49.0 "            | 89.7                         |
| 3 "              | 0.6573 "            | 46.2 "            | 84.6                         |
| 6 "              | 0.6883 "            | 43.7 "            | 80.0                         |
| 9 "              | 0.7457 "            | 39.0 "            | 71.4                         |
| Whiskey residue. |                     |                   |                              |
| 1 per cent.      | 0.5559 "            | 54.6 "            | 100.0                        |
| 6 "              | 0.5705 "            | 53.4 "            | 97.8                         |

*Experiment 28.*

Conditions:

Proteid = blood-fibrin (2 grams).

0.016 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $2\frac{1}{4}$  hours at  $38^{\circ}$ – $40^{\circ}$  C.

<sup>1</sup> The whiskey residue was prepared by simply concentrating a definite volume of whiskey on the water-bath until the alcohol and volatile matter were driven off, then making the residue up to the original volume with water. Hence, 1 per cent. residue means the residue contained in 1 per cent. of whiskey.

|   | Fluid added.      | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|---|-------------------|--------------------|-------------------|------------------------------|
| 0 | per cent.         | 0.1759 gram.       | 91.3 per cent.    | 100.0                        |
| 5 | " absol. alcoh.   | 0.2145 "           | 89.3 "            | 97.8                         |
| 5 | " whiskey residue | 0.1847 "           | 90.8 "            | 99.4                         |

*Experiment 29.*

Conditions the same as in the preceding experiment, except that the period of digestion was  $1\frac{3}{4}$  hours:

|    | Fluid added.             | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|----|--------------------------|--------------------|-------------------|------------------------------|
| 0  | per cent.                | 0.2032 gram.       | 89.9 per cent.    | 100.0                        |
| 5  | " alcohol                | 0.2317 "           | 88.5 "            | 98.4                         |
| 10 | " whiskey                | 0.2181 "           | 89.1 "            | 99.1                         |
| 10 | " " distil. <sup>1</sup> | 0.2499 "           | 87.6 "            | 97.4                         |
| 10 | " " residue              | 0.2002 "           | 90.0 "            | 100.1                        |

*Experiment 30.*

Conditions the same as in the preceding experiment, except that the period of digestion was 2 hours:

|    | Fluid added. | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|----|--------------|--------------------|-------------------|------------------------------|
| 0  | per cent.    | 0.1970 gram.       | 90.2 per cent.    | 100.0                        |
| 5  | " alcohol    | 0.2830 "           | 85.9 "            | 95.2                         |
| 10 | " whiskey    | 0.3056 "           | 84.8 "            | 94.0                         |
| 10 | " " distil.  | 0.2336 "           | 88.4 "            | 98.0                         |
| 10 | " " residue  | 0.2027 "           | 89.9 "            | 99.6                         |

*Experiment 31.*

Conditions the same as in the preceding experiment, except that the period of digestion was  $1\frac{5}{12}$  hours:

|    | Fluid added.                                        | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|----|-----------------------------------------------------|--------------------|-------------------|------------------------------|
| 0  | per cent.                                           | 0.3867 gram.       | 80.7 per cent.    | 100.0                        |
| 5  | " absol. alcoh.                                     | 0.4352 "           | 78.3 "            | 97.0                         |
| 10 | " whiskey                                           | 0.4481 "           | 77.6 "            | 96.1                         |
| 10 | " " distil.                                         | 0.4274 "           | 78.7 "            | 97.5                         |
| 10 | " " residue                                         | 0.4968 "           | 75.2 "            | 93.1                         |
|    | dissolved in water                                  |                    |                   |                              |
| 10 | per cent. residue dissolved in alcohol <sup>2</sup> | 0.3604 "           | 82.0 "            | 101.6                        |

If the detailed results obtained in these many experiments are carefully scrutinized it will be seen that the small amount of solid matter

<sup>1</sup> The "whiskey distillate" was prepared by distilling a definite volume of whiskey nearly to dryness and making the distillate up to the original volume with water, the 10 per cent. whiskey distillate, therefore, meaning the volatile matter contained in that specific volume of whiskey.

<sup>2</sup> The whiskey residue obtained as already described, but dissolved in alcohol of the strength originally present in the whiskey instead of in water.

contained in whiskey—the so-called whiskey residue—has in the majority of cases little or no retarding action on gastric digestion. That there should be some variation is to be expected, owing to possible variations in the amount and character of this solid matter. Further, the residue obtained by evaporation of whiskey is not always completely soluble in water, and the action of this material may naturally be somewhat different when mixed with water than when dissolved in alcohol (see Experiment 31). Still the general conclusion seems to be warranted that, as a rule, the solid matter of the whiskey is not responsible for the retarding action of this fluid upon the chemical process of gastric digestion. Such action as the whiskey possesses is to be attributed mainly to the alcohol or other volatile matter it contains. At the same time it is to be noted that with a fairly active gastric juice (Experiments 29, 30, and 31), the amount of retardation even with 10 per cent. of whiskey is not great, any more than it is in the presence of 5 per cent. of absolute alcohol. When, however, the gastric juice is very weak from scarcity of the active ferment, as in Experiments 26 and 27, then even small amounts of whiskey exercise a very marked retarding effect upon the digestive process. Further, these two experiments plainly show that the retardation in these cases is due essentially to the volatile matter of the whiskey, and not to the solid matter contained in it. We may thus conclude, with Roberts,<sup>1</sup> that taking into account the quantity of whiskey commonly used dietetically with meals, the amount so consumed is not sufficient to appreciably retard the speed of gastric digestion. For, if the digesting mass in the stomach be estimated at 2 pounds, a wineglass (2 ounces) of whiskey added thereto would only equal 5 per cent. of proof-spirit (or 2.5 per cent. of absolute alcohol), an amount too small to hamper digestion to any appreciable extent. Even double such an amount, as Roberts says, would scarcely have any marked retarding effect upon pepsin-proteolysis. Hence, whiskey can be considered to impede the solvent action of the gastric juice only when taken immoderately and in intoxicating quantities.

So much has been said and written about the widespread adulteration and falsification of whiskeys that we deemed it wise before leaving the subject to make a search for samples of this liquor which would show a wide variation from what might be called the normal standard. The results thus far reported were obtained with whiskeys containing 50 per cent. of alcohol by volume. Prof. James Babcock, in his first and second annual report as assayer of liquors to the commonwealth of Massachusetts, gives the strength of 257 samples of ordinary whiskey analyzed by him as varying from 30 to 59 per cent. of alcohol by volume. The few samples that we have purchased in New Haven and analyzed, however, have, with one or two exceptions, shown very little difference in their

<sup>1</sup> Digestion and Diet, p. 133.



content of alcohol, although we took particular pains to obtain them from representative places. The character of these places may be indicated by their names.

|                                          | Alcohol.     |
|------------------------------------------|--------------|
| Sample A, from high-class grocer . . . . | 50 per cent. |
| " B, " Canadian Club whiskey . . . .     | 42 "         |
| " C, " saloon of better class . . . .    | 40 "         |
| " D, " " of low order . . . .            | 44 "         |
| " E, " " of low order . . . .            | 43 "         |
| " F, " " known as the "dead-house" . .   | 42 "         |
| " G, " " known as "Sneezer's" . . . .    | 40 "         |
| " H, " " quite respectable . . . .       | 40 "         |
| " I, " " McGraw's . . . .                | 30 "         |

With the exception of the first and last of these few samples there is very little variation in the content of alcohol. Digestion experiments tried with some of these whiskeys gave the following results:

#### Experiment 32.

Conditions:

Proteid = blood-fibrin (2 grams).

0.015 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $1\frac{1}{4}$  hours at  $38^{\circ}$ - $40^{\circ}$  C.

| Whiskey.       | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|----------------|-----------------------|----------------------|---------------------------------|
| 0 per cent.    | 0.6181 gram.          | 69.4 per cent.       | 100.0                           |
| Sample I, 10 " | 0.6591 "              | 67.1 "               | 96.6                            |
| " B, 10 "      | 0.6876 "              | 65.7 "               | 94.6                            |
| " G, 10 "      | 0.7469 "              | 62.7 "               | 90.3                            |

#### Experiment 33.

Conditions practically the same as in the preceding experiment:

| Fluid<br>added.     | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|---------------------|-----------------------|----------------------|---------------------------------|
| 0 per cent.         | 0.5945 gram.          | 70.3 per cent.       | 100.0                           |
| Whiskey D, 10 "     | 0.7711 "              | 64.5 "               | 91.7                            |
| " C, 10 "           | 0.7352 "              | 63.3 "               | 90.0                            |
| " F, 10 "           | 0.7609 "              | 62.0 "               | 88.1                            |
| " E, 10 "           | 0.8086 "              | 59.6 "               | 84.7                            |
| " H, 10 "           | 0.8659 "              | 56.8 "               | 80.7                            |
| Absol. alcohol, 5 " | 0.8362 "              | 58.2 "               | 82.7                            |

If we compare the action of these samples of whiskeys, we see (Experiment 32) that sample I, with the lowest content of alcohol, has the least inhibitory effect. On the other hand, in Experiment 33 there are greater differences in the retardation produced by these several varieties of whiskey than one would expect from the slight variations in the content of alcohol. This, however, we are inclined to attribute, in part at least, to the presence of variable amounts of tannin. In accordance with this idea, we found that among those samples with a like content

of alcohol the presence of tannin was more conspicuous in the whiskeys with the greatest retarding action.

#### ACTION OF SO-CALLED FUSEL OILS ON GASTRIC DIGESTION.

So much has been written concerning the contamination of whiskeys and other liquors with fusel oil that we deemed it wise to give some thought to this matter in connection with our study of the influence of whiskey, brandy, and other liquors on the chemical processes of gastric digestion. It is a well-known fact that when fermented saccharine liquors are submitted to distillation there are obtained, in addition to water and ordinary or ethyl alcohol, small quantities of other alcohols, which are commonly known as fusel oil. Each raw material used in the preparation of a distilled liquor is supposed to have its own particular form of fusel oil. Hence, there is the potato fusel oil, sugar-beet fusel oil, rye fusel oil, corn fusel oil, grape fusel oil, etc., which contain in various proportions propyl, butyl, amyl alcohol, etc. Of these alcohols, amyl alcohol is said to be the most poisonous, and it is generally understood to be present in largest quantity in the whiskeys made from the potato. However this may be, the various constituents of these fusel oils react upon each other during the process of ageing, forming new and more volatile combinations which help give to the respective fluids their aroma and bouquet. Hence, in old whiskeys fusel oils should be entirely absent, and in all properly distilled and rectified spirits the amount of these substances should be at the most quite small. Indeed, so far as our own experience goes, we have never found more than traces of these so-called oils in the whiskeys or brandies that we have examined. But with a view to ascertaining the effect of such substances on gastric digestion, assuming them to be present in whiskeys and other like liquors, we have tried some experiments with the alcohols of this class, in order to ascertain how their possible presence would influence the chemical processes of digestion. The results may be briefly detailed in the following experiments:<sup>1</sup>

#### *Experiment 34.*

Conditions:

Proteid = blood-fibrin (2 grams).

0.02 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion 2 hours at 38°-40° C.

| Amyl alcohol. | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|---------------|--------------------|-------------------|------------------------------|
| 0 per cent.   | 0.5665 gram.       | 71.6 per cent.    | 100.0                        |
| 0.10 "        | 0.5316 "           | 73.4 "            | 102.4                        |
| 0.25 "        | 0.6176 "           | 69.1 "            | 96.4                         |
| 0.50 "        | 0.6179 "           | 69.1 "            | 96.4                         |
| 1.00 "        | 0.6887 "           | 65.5 "            | 91.4                         |
| 2.00 "        | 0.8801 "           | 55.9 "            | 78.1                         |

<sup>1</sup> These experiments were carried out in our laboratory by Richard F. Rand, Ph.B.

*Experiment 35.*

Conditions the same as in the preceding experiments, except that the period of digestion was  $1\frac{5}{8}$  hours:

| Isobutyl alcohol. | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------------|--------------------|-------------------|------------------------------|
| 0 per cent.       | 0.7225 gram.       | 63.8 per cent.    | 100.0                        |
| 0.05 "            | 0.6580 "           | 67.1 "            | 105.0                        |
| 0.10 "            | 0.7583 "           | 62.0 "            | 97.1                         |
| 0.25 "            | 0.7993 "           | 60.0 "            | 93.9                         |
| 0.50 "            | 0.8313 "           | 58.4 "            | 91.4                         |
| 2.00 "            | 0.8451 "           | 57.7 "            | 90.4                         |

*Experiment 36.*

Conditions the same as in the preceding experiment:

| Propyl alcohol. | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-----------------|--------------------|-------------------|------------------------------|
| 0 per cent.     | 0.6136 gram.       | 69.3 per cent.    | 100.0                        |
| 0.05 "          | 0.5514 "           | 72.4 "            | 104.4                        |
| 0.10 "          | 0.5025 "           | 74.8 "            | 108.0                        |
| 0.25 "          | 0.4944 "           | 75.2 "            | 108.5                        |
| 0.50 "          | 0.5872 "           | 70.6 "            | 101.9                        |
| 2.00 "          | 0.6192 "           | 69.0 "            | 99.5                         |

Larger percentages of propyl alcohol gave the following results, the conditions being the same as in the preceding experiment, except that the period of digestion was  $2\frac{1}{4}$  hours:

| Propyl alcohol. | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-----------------|--------------------|-------------------|------------------------------|
| 0 per cent.     | 0.5323 gram.       | 73.3 per cent.    | 100.0                        |
| 5 "             | 0.7804 "           | 60.9 "            | 82.1                         |
| 10 "            | 1.6271 "           | 18.6 "            | 24.0                         |
| 15 "            | 1.8829 "           | 5.8 "             | 9.0                          |
| 20 "            | 1.9047 "           | 4.7 "             | 6.4                          |

*Experiment 37.*

Conditions the same as in the preceding experiments, save that the period of digestion was  $2\frac{1}{4}$  hours:

| Methyl alcohol. | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-----------------|--------------------|-------------------|------------------------------|
| 0 per cent.     | 0.4892 gram.       | 75.5 per cent.    | 100.0                        |
| 0.5 "           | 0.4492 "           | 77.5 "            | 102.6                        |
| 2.0 "           | 0.4325 "           | 78.3 "            | 103.7                        |
| 3.0 "           | 0.5381 "           | 73.0 "            | 96.7                         |
| 5.0 "           | 0.5333 "           | 73.3 "            | 97.0                         |

When it is remembered that these alcohols, if present at all, are found in whiskeys and similar liquors only in small quantities—hardly more than traces—it is seen that their action on the chemical processes of gastric digestion cannot be very deleterious. Indeed, so far as our



data show, the presence of traces of these alcohols tends to increase rather than to decrease the rate of digestive action. While they may be very undesirable impurities in alcoholic liquors, and may perhaps have many physiological properties detrimental to health, they certainly do not materially interfere with the chemical processes of gastric digestion. Physiologically, it is of interest to note how all of these alcohols, as well as ethyl alcohol, have the property of increasing the rate of digestive action when present in small amount. Also noticeable is the relationship between the position of the alcohol in the series and the extent of its stimulating and retarding action. Thus, methyl alcohol, the lowest member of the series increases the rate of proteolysis even when present to the extent of 2 per cent, while amyl alcohol produces stimulation only when present in amounts less than 0.2 per cent.

## BRANDY.

According to Dr. Edward Smith, of England, "brandy is or should be the choicest and most agreeable member of the class of ardent spirits. It should be prepared by distillation from wine," but as is well known a large amount of the brandy consumed at the present time is simply alcohol distilled as in the preparation of whiskey, and flavored with oil of cognac. From this it may be inferred that brandy will have much the same action as whiskey on gastric digestion.

The brandy used in our first experiments was of good quality, known as Horne's cold distilled brandy, selling at \$1.25 per quart. Analysis showed the following composition:

|                                  |                          |
|----------------------------------|--------------------------|
| Specific gravity . . . . .       | 0.940 (at 19° C.).       |
| Alcohol by volume . . . . .      | 47-48 per cent.          |
| Solid residue at 110° C. . . . . | 0.0430 gram per 100 c.c. |
| Ash . . . . .                    | 0.0054 " " "             |
| Reaction acid.                   |                          |

*Experiment 38.*

## Conditions:

Proteid = fluid egg-albumin (15 c.c.).

15 c.c. albumin solution contain 1.3395 grams dry albumin.

0.006 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion 7 hours at 38°-40° C.

| Brandy.         | Undigested<br>albumin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|-----------------|------------------------|----------------------|---------------------------------|
| 0 per cent.     | 0.3962 gram.           | 70.5 per cent.       | 100.0                           |
| 1 "             | 0.4379 "               | 67.4 "               | 95.6                            |
| 3 "             | 0.5012 "               | 62.8 "               | 89.0                            |
| 6 "             | 0.5218 "               | 61.1 "               | 66.6                            |
| Brandy residue. |                        |                      |                                 |
| 1 per cent.     | 0.3992 "               | 70.2 "               | 99.4                            |
| 6 "             | 0.3654 "               | 72.8 "               | 103.2                           |

*Experiment 39.*

Conditions:

Proteid = blood-fibrin (2 grams).

0.016 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $2\frac{5}{8}$  hours at  $38^{\circ}$ – $40^{\circ}$  C.

| Brandy.     | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------|--------------------|-------------------|------------------------------|
| 0 per cent. | 0.3401 gram.       | 83.0 per cent.    | 100.0                        |
| 1 "         | 0.3306 "           | 83.5 "            | 100.6                        |
| 3 "         | 0.3440 "           | 82.8 "            | 99.7                         |
| 6 "         | 0.3433 "           | 82.9 "            | 99.8                         |

*Experiment 40.*

Conditions the same as in the preceding experiment, except that the period of digestion was  $2\frac{1}{4}$  hours:

| Brandy.     | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------|--------------------|-------------------|------------------------------|
| 0 per cent. | 0.2013 gram.       | 90.0 per cent.    | 100.0                        |
| 5 "         | 0.2251 "           | 88.8 "            | 98.7                         |

*Experiment 41.*

Conditions the same as the above, except that the period of digestion was  $1\frac{7}{12}$  hours:

| Fluid added.                | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-----------------------------|--------------------|-------------------|------------------------------|
| 0 per cent.                 | 0.3247 gram.       | 83.8 per cent.    | 100.0                        |
| 5 " absol. alcohol.         | 0.3554 "           | 82.3 "            | 98.2                         |
| 10 " brandy                 | 0.3752 "           | 81.3 "            | 97.0                         |
| 10 " " distil.              | 0.3489 "           | 82.6 "            | 98.5                         |
| 10 " " residue <sup>1</sup> | 0.3024 "           | 84.9 "            | 101.3                        |

*Experiment 42.*

Conditions the same as the above, except that the period of digestion was  $1\frac{1}{2}$  hours:

| Fluid added.                     | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|----------------------------------|--------------------|-------------------|------------------------------|
| 0 per cent.                      | 0.3361 gram.       | 83.2 per cent.    | 100.0                        |
| 5 " absol. alcohol.              | 0.4040 "           | 79.8 "            | 95.9                         |
| 10 " brandy                      | 0.4242 "           | 78.8 "            | 94.7                         |
| 10 " " distil.                   | 0.4286 "           | 78.6 "            | 94.4                         |
| 10 " " residue }<br>in alcohol } | 0.4334 "           | 78.4 "            | 94.2                         |
| 10 " " residue }<br>in water }   | 0.3609 "           | 82.0 "            | 98.5                         |

<sup>1</sup> Dissolved in water, being the residue from this percentage of brandy.

*Experiment 43.*

In this experiment four distinct samples of brandy were used.

Conditions:

Proteid = blood-fibrin (2 grams).

0.009 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $1\frac{1}{2}$  hours at  $38^{\circ}$ – $40^{\circ}$  C.

| Brandy.     | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|-------------|-----------------------|----------------------|---------------------------------|
| 0 per cent. | 0.7941 gram.          | 60.3 per cent.       | 100.0                           |
| 10    "     | 1.0007   "            | 50.0   "             | 82.9                            |
| 10    "     | 0.9357   "            | 53.3   "             | 88.3                            |
| 10    "     | 0.9304   "            | 53.5   "             | 88.7                            |
| 10    "     | 0.9014   "            | 55.0   "             | 91.2                            |

The experiments here recorded indicate that brandy has a slight retarding action on pepsin-proteolysis when present in quantities ranging from 5 to 10 per cent. When the gastric juice is relatively weak, then the retardation may be quite pronounced, as in Experiment 38. Such action as the brandy possesses is due almost wholly to the contained alcohol. Indeed, the solid matter present in brandy when separated and dissolved in water may even cause a slight increase in the rate of proteolysis. Evidently, we may draw the same conclusions regarding brandy that have been drawn in connection with whiskey. Both owe their action mainly to the contained alcohol; the results obtained with 10 per cent. of brandy being essentially the same as those obtained with 5 per cent. of absolute alcohol under like conditions.

## RUM.

The only essential difference between whiskey and rum, as generally understood, is in the character of the aroma or flavor, and, as the volatile products which are the cause of the flavor are present only in very small quantity, it might be assumed that these two liquors would be very much alike in their general physiological action. The sample of rum (old St. Croix rum, at \$1.25 per quart) with which our experiments were mainly made had the following composition:

|                                           |                               |
|-------------------------------------------|-------------------------------|
| Specific gravity . . . . .                | 0.935 (at $18.5^{\circ}$ C.). |
| Alcohol by volume . . . . .               | 50.8–51.0 per cent.           |
| Solid residue at $110^{\circ}$ C. . . . . | 0.3068 gram per 100 c.c.      |
| Ash . . . . .                             | 0.0070   "   "   "            |
| Reaction acid.                            |                               |

*Experiment 44.*

Conditions:

Proteid = blood-fibrin (2 grams).

0.016 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $2\frac{1}{4}$  hours at  $38^{\circ}$ – $40^{\circ}$  C.



|             | Fluid added.      | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------|-------------------|--------------------|-------------------|------------------------------|
| 0 per cent. |                   | 0.2013 gram.       | 90.0 per cent.    | 100.0                        |
| 5           | " rum             | 0.2304 "           | 88.5 "            | 98.3                         |
| 5           | " whiskey         | 0.2312 "           | 88.5 "            | 98.3                         |
| 5           | " absol. alcohol. | 0.2601 "           | 87.0 "            | 96.6                         |

*Experiment 45.*

Conditions the same as in the preceding experiment, except that the period of digestion was  $1\frac{5}{8}$  hours:

|             | Fluid added.                            | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------|-----------------------------------------|--------------------|-------------------|------------------------------|
| 0 per cent. |                                         | 0.3995 gram.       | 80.1 per cent.    | 100.0                        |
| 5           | " absol. alcohol.                       | 0.5392 "           | 73.1 "            | 91.2                         |
| 10          | " rum                                   | 0.5029 "           | 74.9 "            | 93.5                         |
| 10          | " " distillate                          | 0.4561 "           | 77.2 "            | 96.3                         |
| 10          | " " residue in }<br>50 pr. ct. alcohol. | 0.4691 "           | 76.6 "            | 95.6                         |
| 10          | " rum residue in }<br>water }           | 0.4290 "           | 78.6 "            | 98.1                         |

*Experiment 46.*

Conditions the same as in the preceding experiment, except that the period of digestion was  $2\frac{1}{4}$  hours:

|             | Fluid added.                   | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------|--------------------------------|--------------------|-------------------|------------------------------|
| 0 per cent. |                                | 0.1759 gram.       | 91.3 per cent.    | 100.0                        |
| 5           | " rum residue <sup>1</sup>     | 0.1589 "           | 92.1 "            | 100.8                        |
| 5           | " whiskey residue <sup>2</sup> | 0.1847 "           | 90.8 "            | 99.4                         |
| 5           | " absolute alcohol             | 0.2145 "           | 89.3 "            | 97.8                         |

The results plainly indicate that rum is essentially similar to whiskey in its action on artificial gastric digestion, and that such retardation as it causes is due mainly to the contained alcohol.

## GIN.

Our experiments with this liquor were conducted solely with a sample of so-called "pure Holland gin," the composition of which was as follows:

|                                  |                          |
|----------------------------------|--------------------------|
| Specific gravity . . . . .       | 0.937 (at 16° C.).       |
| Alcohol by volume . . . . .      | 51.0 per cent.           |
| Solid residue at 110° C. . . . . | 0.2968 gram per 100 c.c. |
| Ash . . . . .                    | 0.0090 " " "             |
| Reaction very slightly acid.     |                          |

*Experiment 47.*

Conditions:

Proteid = blood-fibrin (2 grams).

0.015 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $1\frac{5}{8}$  hours at 38°-40° C.

<sup>1</sup> Residue dissolved in water.

<sup>2</sup> Ibid.

| Gin.              | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|-------------------|-----------------------|----------------------|---------------------------------|
| 0 per cent.       | 0.4210 gram.          | 79.0 per cent.       | 100.0                           |
| 1    “            | 0.4722   “            | 76.4   “             | 96.7                            |
| 3    “            | 0.4681   “            | 76.6   “             | 96.9                            |
| 5    “            | 0.4938   “            | 75.4   “             | 95.4                            |
| 10   “            | 0.5725   “            | 71.4   “             | 90.3                            |
| Absolute alcohol. |                       |                      |                                 |
| 5 per cent.       | 0.5506   “            | 72.5   “             | 91.7                            |

*Experiment 48.*

Conditions :

Proteid = blood-fibrin (2 grams).

0.008 gram pepsin ; 0.2 per cent. hydrochloric acid.

Period of digestion  $1\frac{3}{4}$  hours at  $38^{\circ}$ – $40^{\circ}$  C.

| Fluid<br>added.                 | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|---------------------------------|-----------------------|----------------------|---------------------------------|
| 0 per cent.                     | 0.9045 gram.          | 54.8 per cent.       | 100.0                           |
| 10   “   gin                    | 1.0230   “            | 48.9   “             | 89.2                            |
| 10   “   “ distillate           | 0.9961   “            | 50.2   “             | 91.4                            |
| 10   “   “ residue <sup>1</sup> | 0.9508   “            | 52.5   “             | 95.8                            |
| 5    “   absol. alcoh.          | 1.0104   “            | 49.5   “             | 90.3                            |

<sup>1</sup> Dissolved in water.

The results plainly indicate an action on pepsin-proteolysis exactly analogous to that of the related fluids—whiskey, rum, and brandy. As in the case of the latter, such action as the gin possesses is to be ascribed solely to the contained alcohol ; the action of 10 per cent. of gin, with its 50 per cent. of alcohol, being practically identical with that of 5 per cent. of absolute alcohol or 10 per cent. of proof-spirit.

*(To be continued.)*REMARKS ON OPERATIONS ON THE GASSERIAN GANGLION,  
WITH A REPORT OF FIVE ADDITIONAL CASES.<sup>1</sup>

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ON February 14, 1894, I reported to this Society, in conjunction with Dr. John K. Mitchell, a case of tic douloureux, in which I operated on the Gasserian ganglion. The patient, after the lapse of twenty-six months, has remained entirely free from pain with the exception of some slight twinges of pain, which I am inclined now to attribute rather to nervousness than to a real return of his disorder.

The two methods of reaching the ganglion are, first, that devised by

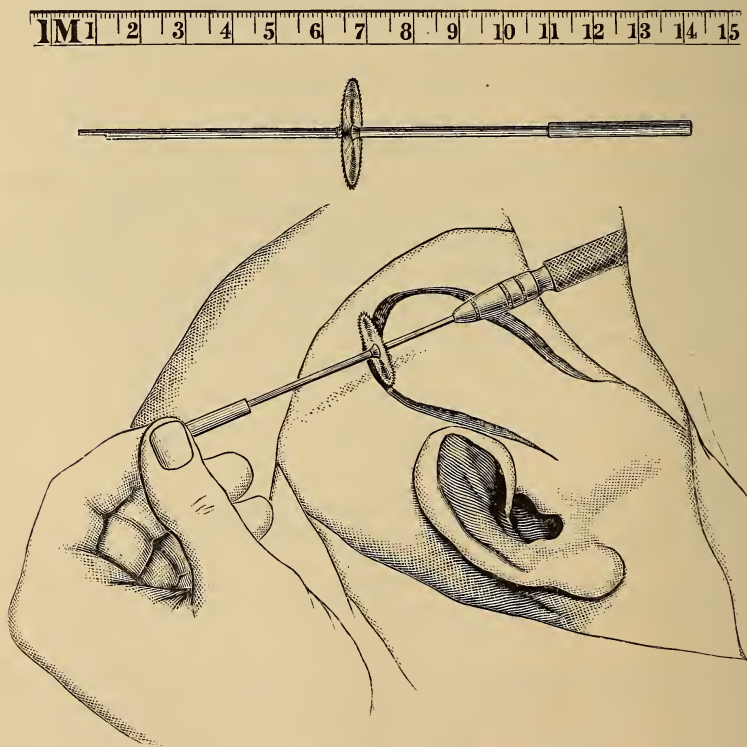
<sup>1</sup> Read before the Philadelphia County Medical Society, Dec. 11, 1895.

Rose, and, secondly, the Hartley-Krause operation. All of the six operations that I have done have been by the latter method, which I regard as much superior to the former: First, because of its smaller mortality, due largely to the more complete asepsis that can be obtained; secondly, because the access to the ganglion is by a large instead of a small and cramped opening; and, thirdly, because we can actually remove the entire ganglion with its roots.

I shall take up the various stages of the operation and make some remarks upon each, based on my experience in six cases, of which five recovered and one died from accidental sepsis.

First. Access to the cranial cavity. This is by means of an osteoplastic flap formed in the temporal region by a large horseshoe-shaped

FIG. 1.



Krause's method or using the circular saw with two hands. (KRAUSE.)

incision, one end of which begins immediately in front of the ear, the other about an inch behind the orbital margin of the external angular process. If the anterior incision goes nearer to the orbit than this point the operator will have to chisel through the thick bone at the lesser



wing of the sphenoid and invade the anterior fossa of the skull. The incision should be three inches vertically and three inches horizontally at its widest part. The two ends of the incision should go down toward the zygoma, in order to reach well toward the base of the middle fossa of the skull. I have had no experience with Krause's circular saw actuated by the surgical engine. (Fig. 1.) Prof. Krause last summer told me that he had found it a very safe and expeditious method of reaching the interior of the skull. One great improvement he has introduced in the saw is the prolongation of the handle directly through the centre of the saw, so that it can be held by two hands, and thus held much more firmly. In two of my cases the skull has been opened by means of Dr. Cryer's drill, a very ingenious and useful means of entering the skull. My other four operations have been done by a chisel, either Hartley's or, what I rather prefer, that of Pyle.

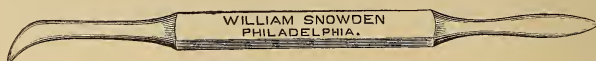
Second. Hemorrhage from the middle meningeal. As soon as the osteoplastic flap, made up of scalp and bone, is turned downward, there will be some hemorrhage from the middle meningeal. Even if the anterior branch does not run in a canal in the bone or in a groove so deep as to be practically a canal, some of its larger branches to the bone are torn and, usually, require ligation of the artery by means of the smallest semicircular needle of Hagedorn, threaded with silk, on account of its greater strength as compared with fine catgut.

It has been my misfortune in three of the cases to wound the posterior branch of the middle meningeal by the chisel penetrating the thin squamous portion of the temporal bone, and at the same time I have had to fight hemorrhage from the anterior branch by its being torn, owing to its passage through a complete or almost complete canal. I have met this accident by placing two fingers over the bleeding points, rapidly gnawing away the bone over the posterior branch by the rongeur forceps, securing this by a ligature, and, when once secured, releasing my finger on the anterior branch and securing that in the same way.

In one case (VI.), while lifting the temporo-sphenoidal lobe from the middle fossa of the skull, with what at the time I deemed to be great gentleness, the main trunk of the artery ruptured about one-quarter of an inch above the foramen spinosum. I was able to secure it in the same way as before, but after much trouble and the loss of a great deal of blood. The broad spatula, by which the temporo-sphenoidal lobe and dura are lifted, was of great service in controlling the hemorrhage temporarily. In two cases the artery ruptured at a still more unfortunate place, namely, immediately at the foramen spinosum, so that it was impossible to ligate it. The expedient adopted in both cases was very satisfactory in controlling the hemorrhage. The moment that I found the source of the bleeding I plugged the foramen spinosum by the curved

end of the Allis blunt dissector.<sup>1</sup> (Fig. 2.) I then quickly substituted my left forefinger for the blunt dissector, thus leaving my right hand free. Next, I quickly substituted a narrow strip of iodoform gauze for my finger and packed it rather tightly into the opening. This strip of gauze I carefully removed on the third day, and in neither case was there any further hemorrhage. A similar accident occurred in one of Krause's cases, and was controlled in a similar manner. To anticipate the hemorrhage from the middle meningeal Fowler tied the external carotid. From my experience I think this is unnecessary. Of course, the external carotid should be ligated, and not the common carotid, since the latter operation is not by any means free from the danger of producing softening of the cerebral hemisphere on the same side in case the circle of Willis is incompetent to re-establish the circulation.

FIG. 2.



Allis's blunt dissector.

Third. Lifting the temporo-sphenoidal lobe from the middle fossa of the skull. This is best done gently by the forefinger, and the brain, with its membranes, is then held up by a broad spatula. Separating the dura from the bone of the middle fossa is always attended with rather profuse hemorrhage, owing to the rupture of many small vessels going from the dura to the bone. This can usually be controlled by packing. In my first case I was fearful that I had torn the cavernous sinus so profuse was the hemorrhage. But experience has taught me that the source of the hemorrhage is as stated. The cavernous sinus has been torn by Finney, Krause, and others, but the hemorrhage, though alarming, has been readily controlled by packing with gauze.

In case the hemorrhage from the middle fossa is very severe I have in three cases done the operation in two stages. First, opening of the skull, separation of the dura from the middle fossa, and packing the cavity with iodoform gauze to check the hemorrhage, and three days later reopening the skull and completing the operation. The amount of packing which the brain will stand has surprised me. In one case I packed a piece, afterward found to be 37 inches by 6 inches, or 222 square inches of gauze; in another, a piece 23 inches by 14 inches, or 322 square inches of gauze; and in the third a piece 16 inches by 6 inches, or 96 square inches. In each instance the gauze remained in place for three days without any material symptoms.

I much prefer, however, to do the operation in a single stage. The

<sup>1</sup> This most useful yet simple surgical instrument is not as well known as it deserves to be, hence I figure it here. In all blunt dissections, which are so largely employed, it is simply invaluable, especially by the facility with which adhesions are torn through by its curved end.

danger of infection is much increased by doing it in two stages, and with a growing experience I have been able to control the hemorrhage better by temporary packing, and also have learned to facilitate the operation by the position of the head. In two of the operations the head was turned sidewise, so that the ganglion and its branches lay practically at the bottom of a well, and a few drops of blood were quite sufficient to prevent my seeing the ganglion and its branches. It is needless to say that at such a depth and with the carotid artery and cavernous sinus so near no prudent surgeon will manipulate unless he can see clearly exactly what he is doing. I find, as would naturally be supposed, that it is much better to operate with the head resting on the occiput and with a bright side-light. By this means the blood runs out as rapidly as it accumulates and does not obscure the parts, and I have found that a good side-light, with the head in this position, obviates the need for an electric light.

Fourth. Recognition and treatment of the ganglion and its second and third divisions. As soon as the hemorrhage in the middle fossa is stopped by temporary packing and sponging, the points of exit of the second and third divisions of the ganglion through the foramen rotundum and foramen ovale can be recognized by the folds or lines of traction produced by lifting the dura. These lines of traction converge at the foramina. Another guide to the third division also is the main trunk of the middle meningeal, which lies at a distance outside the foramen ovale, varying, as Taylor has shown, from  $\frac{2}{16}$  to  $\frac{9}{16}$  of an inch. The ganglion lies at the junction of the axes of the second and third divisions, and the object of the operator is now to completely uncover and separate the second and third divisions, and then the ganglion itself, from the dura. For this purpose I have found the best instrument to be the curved end of the Allis dissector. The dura is gently but firmly drawn back in the axis, first of the second, and later of the third divisions of the nerve, and when the ganglion is reached, by still further traction on the dura, the entire ganglion can be disclosed. It appears like a network of fibres. Having isolated the ganglion and the two divisions, not only from the dura above, but also underneath them, the best way to remove the ganglion with its divisions and its roots is as follows: First, *seize the ganglion itself* with a pair of hæmostatic forceps; then, and not before, as Krause<sup>1</sup> has pointed out, cut the second and third divisions at their foramina; and lastly by a gentle but firm rotation of the forceps the ganglion and its divisions can be avulsed, usually bringing with the mass the sensory root, and, as in my own last case, the motor root all the way back to the pons. (Fig. 3.)

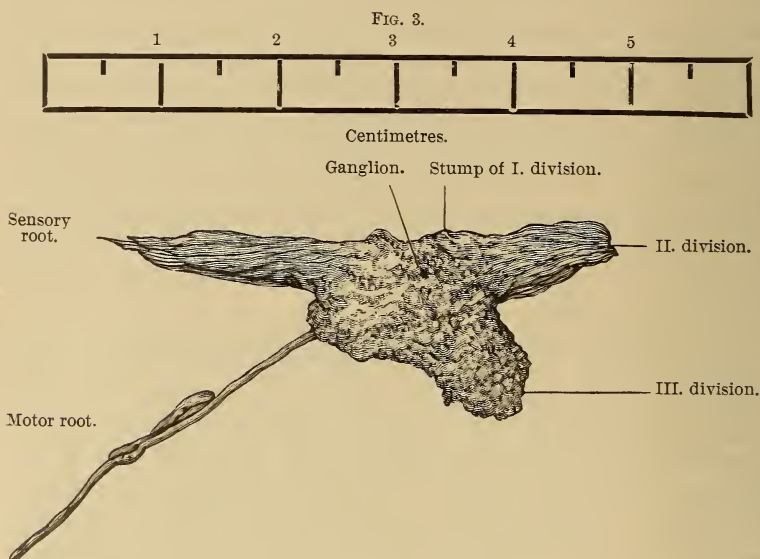
If the second and third divisions are cut at the foramina before the ganglion is seized and an attempt is made to tear them and the gang-

<sup>1</sup> Archiv klin. Chir., 1895, l. 469.



lion out, I found in several cases that the two divisions will generally tear off from the ganglion and the latter be left behind.

It is then difficult, if not impossible, to seize and remove the ganglion. In fact, I believe that in almost all, if not absolutely all, of the



Gasserian ganglion with the II. and III. divisions and the sensory and motor roots removed from Case VI. The nerve fibres are well shown. The motor root is elongated by the accidental reversal of one of its bundles. (From a photograph which unintentionally was enlarged about one-third, but the scale of centimeters which was photographed with the specimen will serve for comparison.)

cases heretofore reported except those of Krause<sup>1</sup> and my last case (Case VI.), the operation has consisted in dividing and tearing away the second and third divisions and then "breaking up" the ganglion by the curette, hooks, or other instruments. It is very doubtful to my mind whether by the method we do more than partially destroy the ganglion; certainly we do not "remove" it. In only two of my cases were any ganglion cells found in the tissue removed from the supposed position of the ganglion, and yet I endeavored to break it up and remove it as completely as possible. Whether it is actually needful to remove the entire ganglion, or whether its partial destruction is sufficient to cure the neuralgia permanently, will be discussed later. If it be needful wholly to remove it, then the *technique* above described will be necessary. The establishment of this *technique* we owe to Krause.

The first division is, of course, not meddled with, since it penetrates the cavernous sinus, but the ganglion is torn away from it. Occasion-

<sup>1</sup> Loc. cit., Pl. VI.

ally a considerable part of the first division comes away with the ganglion.

Mr. Horsley<sup>1</sup> is of the opinion that it is impossible to remove the entire ganglion without seriously wounding the cavernous sinus, but the specimen which I show you from my last case (see Fig. 3) as well as the specimens photographed by Krause prove that the ganglion can be removed in its entirety. Until I saw the photographs of Krause I had been of Horsley's opinion, but I have been compelled to change that opinion.

Clinically, therefore, cases of intra-cranial neurectomy of the fifth should be carefully divided hereafter into two classes: First, those in which the ganglion has been merely more or less broken up; and, secondly, those in which it has been wholly removed; and the result of any recurrence or non-recurrence of the neuralgia should be carefully correlated with the removal or non-removal of the ganglion itself.

Mr. Horsley,<sup>2</sup> in one case, opened the dura, lifted the middle lobe of the brain, and tore out the roots of the ganglion from the pons. The operation, as I have described it, accomplishes the same result with a considerably less danger of mechanical injury because the brain tissue is protected by the fibrous dura, and there is less danger of infection.

The connection between the ganglion and its sensory root apparently is so strong that this root almost always comes away with the ganglion (see Krause's photographs). In my last case the slender cord, passing under the ganglion, cannot, it seems to me, be other than the motor root. Whether it would be possible to separate the motor root from the ganglion and the third division, I do not yet know. I should propose in another suitable case to see whether it is not possible to lift the ganglion, separate it and the third division from the motor root, and then by cutting the third division of the fifth in a direction away from the motor root, possibly to preserve this nerve.

Fifth. Effects of operation on the ganglion upon the cornea. The first operation done by Mr. Rose resulted in the loss of the eye from the trophic changes, induced by the destruction of the ganglion. He, therefore, recommended and practised later stitching together of the eyelids, which, however, has been done in very few cases. I have not seen reported any other cases of serious trouble with the cornea.

In my first four cases I had no such trouble, though I did not stitch the lids together. In Case V., in which the destruction of the ganglion was more complete than in the first four, though the ganglion itself was probably not removed, a corneal ulcer formed shortly after the operation, though I protected the eyeball for four days by an occlusive dressing. I suspect, however, that the lids were opened under the dressing

<sup>1</sup> Brit. Med. Journ., 1891, ii. 1249.

<sup>2</sup> Loc. cit.

and abrasion of the cornea took place without the patient's knowledge, since it was of course entirely anæsthetic. This led me in Case VI. to prevent the opening of the eyes by passing three stitches through the skin of the lids. After four days, there being some slight irritation around the stitches, I cut them and found the eyeball in perfectly good condition. Twenty-four hours later a corneal ulcer had begun to form, and the conjunctiva was very distinctly reddened. To prevent further trouble Dr. de Schweinitz freshened and stitched together the middle fourth of the lids, so as to get union of the two lids. This left the two ends of the palpebral fissure open for the escape of the normal secretions and for syringing. After a few days the lids separated by the giving of the adhesions, and in two days required to be restitched on account of renewed trouble. After a time, if we may judge from experiments upon animals, the lids may be separated and the cornea will not suffer from ulceration. Turner (*Brit. Med. Journ.*, November 23, 1895, p. 1279), from a number of experiments upon animals, concludes that "there is no evidence of trophic influence exerted by the Gasserian ganglion upon the cornea; and that, provided septic organisms are excluded, the ophthalmic branch may be safely divided or the Gasserian ganglion removed without fear of the disorganization of the eye." If this be true the explanation of the trouble in my cases lies in the imperfect asepsis of the eye. But the contrast between my first four and my last two cases, in the latter of which more care was used than in the former, and the speedy relief following protection of the cornea by stitching the lids make one doubtful of its truth in man. V. Hippel (*Archiv f. Ophthalmol.*, 1889, xxxv. 2, p. 217) considered the subject from the experimental side, and says that micro-organisms are of no etiological importance, but ascribes the changes chiefly to drying of the cornea, which he remedies by a moist atmosphere. My own case seems to support this view and the theory of traumatism from exposure of the anæsthetic cornea.

It is noticeable that this corneal ulceration followed only in the two cases: one of extensive destruction and the other of absolute removal of the ganglion. Krause has reported eight such complete removals with one death. One of the seven that recovered was suffering from chronic conjunctivitis at the time of operation. A corneal ulcer formed, but was cured. None of the others suffered.

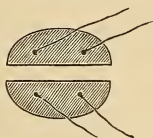
In future I shall unite the two lids in the centre and keep them united for some time after the operation, in order to make sure of the safety of the eye, or else advocate the expedient which has occurred to me since my last case was operated on. The late Dr. Levis, after his cataract operations, to keep the eyelids closed, used to place a semi-oval piece of adhesive plaster on each lid, the plasters acting as splints and preventing the separation of the eyelids. I should propose to use the same means,



supplemented, if necessary, by two threads sewn through the plaster only (Fig. 4). Should the plaster not be sufficient to keep the lids together, the threads could be tied in a bow-knot, thus enabling one to separate the lids for inspection of the cornea and for medication of the eye, and at the same time to readjust them and keep them in approximation. The plasters should be of the entire width of each lid.

Since the above was written I have tried another method, suggested by the nurse in charge of Case VI. A large oval piece of plaster, with

FIG. 4.



Two pieces of adhesive plaster with threads, to be applied to the two lids and tied together.

a narrow slit corresponding to the fissure of the lids, is applied to the lids and seems to retain them well in apposition, and at the same time allows of inspection and medication of the cornea.

This raises also the question as to whether the more or less complete destruction of the ganglion, which has been done by most operators, is not sufficient to cure the neuralgia and whether the avulsion of the entire ganglion may not be a needlessly severe operation, especially by the peril to the eye. It does not seem thus far to have increased the mortality, but I suspect it does increase the danger to the eye in spite of Krause's happy experience and Turner's recent experiments. If time shows that the cure of the neuralgia by simply breaking up the ganglion is permanent, I should certainly be content with that. The fact that there have been a few moderate relapses, however, makes me suspect that the removal of the ganglion itself may be necessary. The intracranial avulsion of the second and third divisions from the ganglion, leaving the ganglion intact, does not seem to suffice, for in one such case Krause was obliged later to remove the ganglion itself to cure a return of the neuralgia. We shall be in a position within a few years to decide this question positively.

Sixth. Results as to recovery and cure. The most complete statistics that have been given of the mortality of the operations are those in Krause's recent paper, in which he has reported that in twenty-two cases done by Rose's method, the mortality has been 4 or 18 per cent., whereas in fifty-one operations by the Hartley-Krause method, the mortality has been only 5 or 9.8 per cent. The mortality, therefore, is much less by the latter method. It is quite certain also that if we regard the removal of the ganglion itself as an important step in the operation, this is impossi-

ble by Rose's method, since we are working in so small a space as to make it impracticable to see and manipulate the ganglion.

As to the permanence of the cure this seems to be thus far more satisfactory than the results from any of the peripheral operations. The only recurrences that I have seen reported are one case of Rose's and two of my own. Rose's was only a partial return, and my own two are very probably not true recurrences which will lead to a relapse. At the same time I have thought it right to state the facts exactly as they exist (see Cases I. and II.).

To give all my six cases to date I reproduce a short summary of the first (published in full in the *Transactions* of the Philadelphia County Medical Society for 1894), with rather fuller histories of the other five heretofore unpublished cases.

CASE I. *Breaking up of the Gasserian ganglion after thirteen prior operations. Done in two stages on account of packing to arrest the hemorrhage; recovery; cure for twenty-six months; possible slight return(?)*.—Dr. K., aged forty-one years. He had suffered from neuralgia for thirteen years and had had thirteen operations done, including removal of a large part of the upper jaw, as well as various branches of the nerves. The anterior branch of the middle meningeal passed through a canal and was, of course, torn in turning down the flap. In chiselling the posterior portion of the flap, the posterior branch was also divided and the dura wounded. Both vessels were secured after much trouble. The hemorrhage, on lifting the middle lobe, was so great that the cavity was packed and the operation completed in a second stage after three days, the ganglion being broken up. The piece of gauze was found to measure thirty-seven by six inches, or two hundred and twenty-two square inches. This remained in the skull for three days, during which time his temperature had risen to 100.8°, and the respiration had gone down to from six to ten in a minute, with a slight aphasia. Immediate recovery followed the completion of the operation. He has suffered from temporary twinges of the pain, but except these he has been free from pain, and is present to-night for your examination.

CASE II. *Breaking up of the Gasserian ganglion in two stages after eight prior operations; recovery; cure for eighteen months; possible slight return*.—C. H. B. was kindly sent to me on June 14, 1894, by Dr. John B. Roberts (who was leaving town). His neuralgia began in April, 1886, shortly after a dentist hammered the gold filling into a tooth so hard as to give him great pain. Soon after the neuralgia began, all his teeth on the right side of the upper jaw were removed. A large number of drugs were tried without relief. In 1889 subcutaneous neurotomy was twice done. In March, 1890, the antrum was drilled. In April, 1890, Dr. Roberts removed several polypi from the nostrils, straightened the septum, and, later, resected a portion of the right infra-orbital nerve. In May, 1890, and again in November, 1890, the infra-orbital was resected for the second and third times by Dr. Roberts. January 31, 1891, Dr. Roberts tied the right carotid. In March, 1890, before Dr. Roberts saw him, the sight of his right eye began to fail, and in February, 1891, his physician in Florida stated that he had a glaucoma of the right eye, for which he removed the crystalline lens. When

I first saw him in June, 1894, the right eyeball was shrunken, the cornea opaque and thickened, and the eye utterly useless. The lids could not be completely closed. The right face was shrunken over the region of the antrum. For three years he had never been free from excruciating pain.

Operation, June 18, 1894, at the Orthopedic Hospital. The anterior branch of the middle meningeal ran in so deep a groove as to be practically a canal, and the artery was torn in turning the flap down. It was immediately secured by a ligature. On lifting the temporo-sphenoidal lobe, the hemorrhage was so profuse that I finally packed the wound with gauze and closed it temporarily for three days.

June 21, 1894. The gauze, when removed, measured sixteen by six inches. A culture was made at the first stage of the operation, and again at the second stage another culture was made from the inner end of the iodoform gauze, which had been in the skull for three days and looked as if there were pus on the end of it. Dr. Kyle reported that both tubes proved to be entirely sterile.

The second and third divisions were torn loose from the ganglion, the pocket for the ganglion readily found, torn open, and the ganglion broken up. The tissue, which was supposed to be removed from the site of the ganglion, was given to Dr. C. W. Burr, the pathologist of the hospital, who reported that there were neither nerve-tubules, nor nerve-cells to be found. During the three days between the first and second stages of the operation, the temperature had gone up to 102°. The day after the gauze was removed and the ganglion broken up, the temperature fell to 99°. In four days he was out of bed, and in ten days entirely well.

On July 3d Dr. de Schweinitz enucleated the right eyeball, both as a cosmetic operation and to avoid possible mischief to the other eye. The operation was done without an anæsthetic. He complained slightly of pain, the worst being felt when the scissors were thrust well back of the eyeball and the optic nerve divided. At no time has there been a single spot of complete anæsthesia over the entire face. He writes me November, 1895, that he had lately had a short attack of pain. Whether this is a precursor of a return of his neuralgia time must determine. From the experience of Case I. there is reason to believe that it will not prove to be so.

CASE III. *Breaking up of Gasserian ganglion after two prior operations; rupture of the middle meningeal at the foramen spinosum; infection during operation; death from septic meningitis.*—Mrs. E. E. H., aged sixty-three years, was admitted to the Jefferson Hospital, February 19, 1894. At Christmas, 1882, she fell, striking the nape of her neck on the edge of a marble step. A month later she began to suffer lancinating pains, starting above the left mental foramen and radiating over the entire lower and upper jaws and in the temporal fossa, sometimes also as far down as the clavicle and extending to the tip of the tongue.

In 1889, at the Orthopedic Hospital, Dr. Morton removed a portion of the inferior dental nerve. The pain was entirely relieved in the lower jaw, but later returned there and at the tip of the tongue.

Second operation. She was admitted to the Jefferson Medical College Hospital, February 23, 1892, when I removed the inferior dental and lingual nerves by trephining the vertical ramus of the jaw. This method, which weakens the ramus less, I judged better than that of Horsley



(*Brit. Med. Journ.*, 1891, ii. 1192), in which he deepened the sigmoid fossa between the condyle and the coronoid process of the jaw. She was entirely free from pain until November, 1893, when it recurred again, especially in the region of the left side of the nose and cheek, the pain being described as resembling "forked lightning." It is typical of the worst form of tic douloureux. At no place is there complete anaesthesia on the left side of the face, but, on the contrary, a large part of the skin is hyperæsthetic. The pain now exists in both the second and third divisions of the fifth.

Operation, Jefferson Hospital, February 20, 1895. The anterior branch of the middle meningeal ran in a canal and was ruptured. The bone was divided by Dr. Cryer's drill.

In lifting the temporo-sphenoidal lobe, the middle meningeal ruptured directly at the foramen spinosum. The hemorrhage was arrested by plugging the foramen with the Allis dissector, then substituting my left forefinger for the dissector, and then substituting a piece of gauze for my finger.

During the operation an assistant, when my back was turned, inadvertently placed one of the drills in his mouth, and, without disinfection, it was used in completing the section of the bone. From this, to me unknown, source of infection, unquestionably, the wound became infected. On the second day her temperature rose rapidly, and at the end of a week she died. The post-mortem showed that death resulted from septic meningitis, pyogenic cocci being found by culture.

The hemorrhage of the middle meningeal, which I arrested with a small bit of gauze, was not a serious element in the case, since the amount of blood lost was not very great, and on the third day after the operation the gauze was removed without further hemorrhage.

CASE IV. *Breaking up of Gasserian ganglion after five prior operations; done in two stages on account of hemorrhage; packing with gauze for three days; recovery; cure for seven months; necrosis of the bone in the flap.*—Mrs. S. R., aged sixty years. She was kindly referred to me by Dr. Clara T. Dercum, May 21, 1895. She has been a typical sufferer with facial neuralgia for five years in the second and third divisions of the right fifth, for which Dr. Steinbach has done five operations on these two divisions, the last one being a division of both branches just beyond the foramen rotundum and foramen ovale.

Operation, May 23, 1895. Profuse hemorrhage occurred on turning down the flap, in consequence of rupture of the anterior branch of the middle meningeal, which ran in a very long canal in the bone. It was secured by catgut ligature, when the hemorrhage ceased. Again on lifting the temporo-sphenoidal lobe, the hemorrhage was so great that after spending a good deal of time I found it impossible to see clearly the later steps of the operation, and therefore packed with a piece of gauze, afterward found to measure 23 inches by 14, or 322 square inches. Three days later, May 26th, I reopened the wound, removed the second and third divisions, and broke up the ganglion. Five days later, all the stitches were removed and the wound was found united excepting at the two ends of the incision. From these a few drops of pus escaped. While the gauze remained in the head, her temperature was 100° to 101° and she seemed a little drowsy; the latter may have been due to opium which was required to quiet her pain, which did not cease until a number of days after the operation. Two days after the

gauze was removed and the second stage of the operation completed, her temperature fell to the normal, and she went home shortly after. A slight discharge has continued from the two ends of the incision, and at a third point, which later reopened, and some fragments of bone have been discharged. She has, however remained entirely free from pain.

Dr. Kyle reports that he found "undoubted ganglion cells in the tissue removed. The central portion of the section showed slight, if any, variation from the normal, but the outer portion showed some inflammatory infiltration. Sections of the nerves showed a thickened neurilemma (inflammatory) with infiltration of round and spindle cells. There was no apparent change in the axis cylinders or the white substance."

CASE V. *Curetting of the Gasserian ganglion after two prior operations. Rupture of the middle meningeal at the foramen spinosum. Post-operative corneal ulcer; recovery; cure for two months.*—Mrs. F., aged fifty-four years; first consulted me at the instance of her son, Dr. F., July 15, 1891. Twelve years previously she had a small abscess at the root of a lower right molar tooth, and from that trouble dates her neuralgia. The pain was at first confined to the inferior dental nerve. All of her teeth were removed and various drugs used with more or less success. In 1887 she consulted Dr. William Pepper, and on April 29, 1888, Dr. Agnew removed a half-inch of the inferior dental nerve. This gave relief for eighteen months, when her neuralgia returned, involving the superior maxillary division. In 1891, when she saw me, the pain existed in the distribution of both the second and third divisions of the fifth. It was the usual frightful pain of tic douloureux. Her face was extremely hyperæsthetic.

Second operation, July 17, 1891. At the former trephine opening in the lower jaw just above its angle was a small opening through which some fibrous tissue passed. I trephined at the same point and found the nerve reproduced and thickened to about the size of the median nerve. I removed an inch and a half of the nerve by avulsion and then removed the superior maxillary nerve, dividing it well back of the infra-orbital canal.

This operation gave her relief for another eighteen months or two years, when the pain returned as bad as ever. Her physician, Dr. Moore, of Spartanburg, S. C., brought her to see me early in October, 1895. I recommended and she accepted an operation on the Gasserian ganglion.

Third operation, October 6, 1895. The ordinary Hartley-Krause osteoplastic operation was done. In chiseling the lower part of the incision just in front of the ear, the posterior branch of the middle meningeal was divided, although I took every precaution not to go through the bone, as in a woman of her age and so thin as she, I judged that the bones of the skull were probably very thin.

As soon as I turned down the flap of bone, I found that the anterior branch of the middle meningeal went through a canal and was torn, and the posterior went through a very deep groove, in which my chisel had divided it. In addition to this, there was a rent in the dura, which must have been made by the chisel penetrating, without its being perceived, into the interior of the skull cavity. I finally succeeded, with great difficulty, in securing the posterior branch; the anterior was comparatively easily controlled. I then carefully lifted the dura from the middle fossa, but in doing so the middle meningeal tore directly at the

foramen spinosum, and a profuse hemorrhage followed. I was able, however, to arrest this by getting the curved end of the Allis blunt dissector into the canal and then substituted, first, the forefinger of the left hand and then a piece of iodoform gauze, by which I controlled the bleeding completely.

I then exposed and cut the second and third divisions at their foramina, grasped them with forceps, and endeavored to avulse the ganglion with them. The two branches each tore off from the ganglion, but I was able to scoop out most of the ganglion with a curette. What I took to be the cavernous sinus was perfectly visible and avoidable.

The small piece of gauze packed into the foramen spinosum was brought out through the wound and the wound closed with interrupted silkworm-gut sutures.

Dr. Kyle reported on the tissue which was supposed to be the ganglion that it was undoubtedly portions of the ganglion, since he found nerve cells as well as tubules in the tissue.

Three days after the operation, I very carefully removed the small bit of iodoform gauze which blocked up the middle meningeal artery, and no hemorrhage followed. The wound was healed in the course of a week.

On the third day after the operation her eye became red and a corneal ulcer began to develop. I placed her in charge of Dr. de Schweinitz for the ulcer of the cornea. In spite of the utmost care, this broadened and deepened to a considerable extent, and at one time was very threatening, but by long-continued treatment by atropine, boric acid solution, hot compresses, bandaging the eyes with the greatest care, etc., she finally went home, November 27, 1895, with a distinctly healing ulcer and without any pain.

*CASE VI. Removal of the entire Gasserian ganglion, with its second and third sections and its sensory and motor roots back to the pons in a piece 4 centimetres long, after four prior operations; recovery; cure for three weeks; post-operative corneal ulcer.*—C. H. E., aged thirty-three years, was kindly placed under my care in the Orthopedic Hospital by Dr. M. H. Cryer, November 16, 1895. Family and prior personal history negative. Five years ago had an attack of diphtheria, and soon after this his trigeminal neuralgia began on the right side of his face. At first the attacks occurred about once in a month, but increased in frequency and severity until September, 1894, when they became almost constant. In March, 1895, the teeth on the right side of the upper jaw and the alveolar process were removed. Since then he has had three other operations done, including removal of the infra orbital nerve and opening of the antrum. The most tender spot in his face is at the angle of his mouth, though the pain includes both the first and third divisions of the nerve, as well as the second. Even conversation is scarcely possible to him.

Medical treatment has been employed without any permanent relief. Dr. de Schweinitz and Dr. Archibald Thomson kindly took charge of his eyes. The latter examined his eyes November 18, 1895, and reported the pupils, disk, fundus, and muscular balance normal, but that he had hypermetropic astigmatism 2 D. in each eye.

Operation, November 22, 1895. In view of the trouble which I had with the eye in Case V. I decided to stitch the lids together as the first step of the operation.

The Hartley-Krause operation by an osteoplastic flap was done.



When the skull cavity was opened the anterior branch of the middle meningeal was torn at a point where a large branch penetrated the bone. This was ligated with catgut. On lifting the temporo sphenoidal lobe from the middle fossa a furious hemorrhage took place in spite of the fact that I had done it only with my finger and with the greatest gentleness. I packed it for a few moments with iodoform gauze, and then on withdrawing the gauze and lifting the brain by a spatula I found that it came from the middle meningeal, about one-quarter of an inch above the foramen spinosum, where the artery had ruptured. I could see no reason for its rupture at that point. With very great difficulty I was finally able to pass a fine silk ligature under the dura, encircling the vessel and securing it. I soon brought into view the second, and, later, the third divisions of the fifth nerve. With the curved end of the Allis blunt dissector I was able to uncover the second division and then the third as far back as the ganglion, and then with the same instrument gradually to push the dura back and disclose the entire ganglion. Following Dr. Krause's advice (*Arch. klin. Chir.*, l. 469), I then seized the ganglion itself with a pair of hæmostatic forceps before I divided the two branches at the foramina. I next cut the branches at their foramina, and then slowly and most carefully twisted the forceps which had hold of the ganglion itself, and the sensory root as far back, I judge, as the pons tore out quite readily. With it also was a much more slender filament, which went under the ganglion, and which I deemed to be the motor root. (See Fig.3.)

The length of the entire specimen from the anterior end to the end of of the sensory root is 4 cm., and to the end of the motor root 5 cm. From the ganglion the second division measured 13 mm., and the third division 9 mm. From the ganglion to the end of the sensory root was 2 cm.; to the end of the motor root 3 cm. The moment that the ganglion was torn out it was unfolded and photographed, and then placed in Müller's fluid.

On tearing out the ganglion quite a profuse hemorrhage occurred at that point. I judged it to be at the aperture in the cavernous sinus, where the first branch was torn loose. I packed it quickly with iodoform gauze, and, finding that temporary packing did not arrest it, I packed it with a fresh strip 10 inches long and 1½ inches wide, and then closed the wound.

The operation was long (two hours) on account of the difficulty in dealing with the hemorrhage. I did not use any electric light, as I found a good side-light with the head resting on the occiput was very excellent, and this position of the head is more favorable to manipulation, since the blood flows out more readily than if the head is turned with the operation side up, when the blood accumulates at the bottom of the cavity, the very place where one wishes to see well.

He was placed in bed in very good condition with very moderate shock. Later in the afternoon I was called to see him on account of some bleeding. I found two small vessels on the edge of the flap had been bleeding somewhat, but the hemorrhage ceased immediately on my ligating them.

The next day, November 23d, I found that he had passed an uncomfortable night; was complaining greatly of frontal headache, and his temperature had steadily risen until it reached 104°. I was persuaded that this was due either to pressure from the gauze or to the retained wound-fluids and the absorption of their fibrin ferment, or to both causes.

That pressure alone could do it I doubted, in view of my experience with three prior cases. I was very loth to remove the packing as early as twenty-four hours, fearing the recurrence of hemorrhage, but I was forced to do it. Accordingly, I removed it very gently, and was happily surprised in finding no bleeding; only about an ounce of bloody serum escaped. The wound in the skin was kept open by a small bit of iodoform gauze to the depth of half an inch. Within an hour his temperature was down to 99° and his headache gone. From that time he made a speedy and uneventful recovery, and the stitches were all removed on the eighth day.

Four days after the operation it was thought that the stitches in the eyelids, which were producing a little irritation, could be removed with safety. The eyeball appeared entirely normal. Within twenty-four hours, however, signs of corneal ulceration began, and on the sixth day Dr. de Schweinitz, without any anæsthetic, freshened the edges of the lids and stitched them together in the middle, the ends being left open in order that the secretions might escape, and also for purpose of irrigation. No pain attended the operation.

When Dr. de Schweinitz stitched the eyelids together he noted the following conditions of the cornea: The exact centre of the cornea is occupied by an area 3 mm. by 4 mm. of loss of superficial epithelium, with a slightly corrugated edge. Upward and outward from this is a small corneal infiltration; there is slight œdema of the upper lid. Vision in the right eye, 20/100; in the left eye, 20/40. In four days the corneal irritation subsided entirely. The adhesion between the lids gradually yielded, and the lids were separated after five days. The eye was meantime protected by a gauze dressing. In two days after the separation of the lids the cornea again became ulcerated, and the conjunctiva reddened so that the lids were again stitched together. The eye is now improving.

Dr. John K. Mitchell kindly examined the sensation for me and reported as follows:

"November 28, 1895 (sixth day). The right half of his face is wholly anæsthetic to touch, pain, and temperature change (the tongue included). Sensation is dull for pain upon the whole left (sound) side; perception slow; prick only felt as touch if superficial; when pricked deeply says it gives "pain, but not severe." This paræsthesia exactly follows the same distribution as the total anæsthesia of the operated side, ceasing upon the under surface of the inferior maxilla, so that the central part of the throat back of the chin is normally sensitive, and normal sensation is present from there downward. Sensation to heat and cold was accurate upon the left side, and their perception and differentiation were as rapid as in health. It was not possible to test taste at this time.

"December 7, 1895 (fifteenth day). The left side presents wholly normal sensibility in all forms to-day, and no delay in appreciation of touch or pain is to be discovered. The line is sharply drawn at the median line of the face. Total anæsthesia and analgesia upon the right, normal sense-perception on the left.

"Taste is wholly lost to all forms of stimulation upon the right half of the tongue and all the way back to the root, if the patient's statements are correct. Tests were made with salt solution, sugar solution, and vinegar.

"Touch and pain sense are absent upon the right side of the tongue also, and upon the gums of the right jaw."

The specimen has not yet been examined. Dr. Kyle will make a full report of its condition hereafter.

## R E V I E W S.

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SYSTEM OF SURGERY. Edited by FREDERIC S. DENNIS, M.D., Professor of the Principles and Practice of Surgery, Bellevue Hospital Medical College; Visiting Surgeon to the Bellevue and St. Vincent Hospitals; Consulting Surgeon to the Harlem Hospital and the Montefiore Home, New York; President of the American Surgical Association; Graduate of the Royal College of Surgeons, London; Member of the German Congress of Surgeons, Berlin. Assisted by JOHN S. BILLINGS, M.D., LL.D. Edin. and Harv.; D.C.L. Oxon.; Deputy Surgeon-General, U. S. A. Vol. II. Minor, Plastic, and Military Surgery; Diseases of the Bones; Orthopædic Surgery; Aneurism; Surgery of the Arteries, Veins, and Lymphatics; Diseases and Injuries of the Head; Surgery of the Spine; Surgery of the Nerves. Philadelphia: Lea Brothers & Co., 1895.

ANOTHER volume of this important work will be received with universal satisfaction by the medical profession. Minor Surgery receives excellent treatment at the hands of Henry R. Wharton. Bandaging is finely illustrated from photographs, though exception must be taken to a very few old cuts. An impossible illustration of leg-ulcer bandaging, copied from Liston, is an example. While this portion of the work is not intended to present treatment, the statement on page 105 that electrolysis has been applied with success in the treatment of malignant growths is open to question. In washing out the bladder a funnel and tube makes a cleaner and safer apparatus than the rubber bulb and stopcock advised. Reference should be made to the prevention of catheter cystitis. Using the female catheter by touch, as here advised, is a prolific source of bladder disease, owing to contact with vaginal secretions, and is seldom justifiable.

The Plastic Surgery of to-day is described in an admirable article which does not fail to give details of method, sizes of flaps, strength, of solutions, practical points of dressing, all of which seemingly minor matters are so essential to success. The subject of hare-lip receives particularly intelligent treatment. The functional derangements due to cleft palate receive consideration. The uses and defects of prosthetic appliances are discussed as well as operative treatment. While it cannot be denied that the employment of the apparatus of Kingsley and Süersen and others gives the best functional results as compared with those following the most successful operations, it is still true that certain cleft palate cases should be operated upon. Acquired defects of the hard palate, not due to syphilis, are considered not infrequent. They are best treated by apparatus, as failure is the rule after operation. The use of normal salt solution is frequently mentioned as desirable in delicate plastic work. Decalcified bone chips or plates are considered



the best material for bone grafting. Buttons of bone should be replaced after trephining, though they merely serve as scaffoldings for infiltration by bone-forming cells.

Because the surgeon in civil practice may at any time be called upon for military duty the incorporation of an article on Military Surgery is most wise in a work of this character. Lieutenant-Colonel W. H. Forwood, of the United States Army, has been selected as its author. Much which has been believed in the past will have to be revised after an experience not yet attainable with new projectiles, and aseptic methods in the field. The writer pertinently remarks that there will be fewer doubtful cases as the effects will be more definite. That the small calibre bullet rarely remains in the body, that it rarely deforms even against bone, and rarely carries clothing or infectious material into the wound, are new features of the greatest importance to the surgeon and the patient. The problems of field service are here presented in a most sensible and practical manner. The standpoint of the writer is especially to be commended as meeting the demands of aseptic work while avoiding hopeless effort to do what becomes impracticable under the conditions of actual battle. A key-note is the preparation for care of the wounded as near as possible to the field as against long and dangerous transportation to division or general hospitals. Plea is made for lightly equipped flying ambulances and pack mules. The place which heat will occupy in securing asepsis in the field is fully recognized.

To Nicholas Senn has been assigned the discussion of Diseases of Bones, resulting from Malnutrition and from Infection. The former are considered to be Rachitis, Osteomalachia, and Fragilitas Ossium, though he considers that the microbic origin of some of these will undoubtedly be shown. Microbes reach the weak point through the circulation, when no lesion exists. In osteomyelitis the gastro-intestinal canal is undoubtedly a more frequent route through which infection takes place than is generally supposed. Early operation is strongly urged before any appreciable swelling has appeared. In the late operation the author uses his well-known method of filling the involucrum with decalcified bone-chips. In tubercular osteomyelitis, parenchymatous injections constitute an important part of the treatment. Typical resection should be avoided, if possible. Surgeons limit the operative procedure more and more to the removal of the diseased tissue, in place of typical resection.

Orthopædic Surgery is written from the standpoint of the true specialist by V. P. Gibney, an author of wide experience, who is not practising general surgery. In tubercular ostitis of the spine abscesses are to be let alone, if possible. Aspiration is considered preferable to incision, as long observation has taught the author that sepsis almost always sooner or later follows the latter. The direct incision upon the spine and removal of tuberculous foci is in general discouraged. The author deprecates the growing tendency to do open incision instead of subcutaneous tenotomy in connection with deformities of the feet. As to osteotomy, he finds that major operations in club-foot are seldom called for. Removal of the astragalus has much to commend it in suitable cases. The discussion of the various forms of apparatus for the treatment of hip-joint disease is most interesting and valuable. The rule is to aspirate all abscesses, no injection following. After ankle

sprains the author strongly advocates the adhesive plaster dressing with immediate use of the foot.

In an article on Aneurisms, Lewis A. Stimson reviews the general subject, while special aneurisms are considered separately by Percival R. Bolton. As to treatment, "antiseptic ligature of the artery at the nearest convenient point above the aneurism is the method most often to be selected in ordinary, uncomplicated, external aneurisms," while extirpation of the sac is doubtless to be preferred in small or medium traumatic cases, and possibly also where interference with the venous flow added to occlusion of the artery will imperil the limb. Valuable statistical information is given in considering each of the special aneurisms.

The Surgery of the Arteries and Veins, exclusive of aneurisms, is admirably presented by the editor-in-chief, Frederic S. Dennis, attention being chiefly directed to pathology and to principles of treatment, the detail of the ligation of special vessels being very properly omitted.

The Lymphatic System has but recently begun to receive the attention it deserves, though its importance to the surgeon all will admit. The very valuable article by Frederic H. Gerrish will be found to contain much that is suggestive and useful. Two colored plates show the areas drained by the various groups of channels about the head, the axilla, and the groin. These diagrams are unique and of great value. As having an all-important, because causal, relation to some diseases formerly considered surgical deformities only, a summary of all that is known of Filariasis is given. The hopelessness of treatment of elephantiasis and lymph scrotum, except by amputation, is relieved by the probability that their prevention is as easy as the boiling of drinking water.

The longest section of the volume is devoted to the Diseases and Injuries of the Head, by Roswell Park. It is impossible, in a mere review, to give a just idea of this magnificent presentation of a most important branch of surgery. Well-chosen illustrations and clear analysis aid the reader. Thoroughness is characteristic of the treatment of the subject throughout.

To the living questions in connection with Surgery of the Spine, W. W. Keen brings the light of research, of experience, and of analysis of the best present opinion. In spinal fractures with deformity not immediately reduced by extension, operation is advisable; with due limitations arising from the time that has elapsed, the region involved, and the severity of the lesion. No operation should be done when there is persistent absence of knee-jerks and other reflexes, except, possibly, the plantar reflex. An excellent study of localization methods is given, illustrated by a table of segment functions and by diagrams of nerve distribution. The *technique* of laminectomy receives clear and careful treatment.

The Surgery of the Nerves receives from the pen of John B. Roberts the attention which the importance of the subject demands. Diseases of the nerves are first considered, then their injuries, and the operations which are undertaken upon special nerves or ganglia. The whole subject is admirably presented.

The volume as a whole is entirely in keeping with the high standard expected of the work. The method of presenting signed articles gives a vitality and authority to the various sections which cannot be attained

by any method involving supposed agreement among many writers. The work cannot fail to take a permanent place as a surgical authority, decidedly cosmopolitan in tone, yet in harmony with the high standards of the best American surgery.

G. E. S.

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PRACTICAL DIETETICS, WITH SPECIAL REFERENCE TO DIET IN DISEASE.

By W. GILMAN THOMPSON, M.D., Professor of Materia Medica, Therapeutics, and Clinical Medicine in the University of the City of New York, Visiting Physician to the Presbyterian and Bellevue Hospitals. Pp. xxii., 802. New York: D. Appleton & Co., 1895.

WE quite agree with the author that the subjects which are so fully discussed in this volume are frequently dismissed in brief and indefinite phrases by the writers upon the theory and practice of medicine. Even in systematic works upon food and dietetics, the practical needs of the careful physician are neglected in the enormous volume of chemical and physiological reports. We have read this book, keeping in mind the Pavy and the Chambers of our student days, knowing that very great and important advances have been made in our knowledge, and at the same time believing that these changes should be recognized, compared with our previous knowledge, and, at the same time, brought into harmony with the existing high standard of medical practice. To secure adaptability to the daily needs of the physician, not the work of the chemist, nor of the physiologist, should be made the standard for the determination of food values, but the findings of those working in these special lines of investigation should be studied, compared, and harmonized, not by the student in his library, but by one who, with considerable acquaintance with chemical and especially physiological literature, rounds out his attainments by carefully making use of the literature in his effort that those who may come under his professional care may have prescribed for them an appropriate diet. The fact that the author has written a successful book is due, not only to his knowledge as a chemist and his studies as a physiologist, but as well to the fact that he is a practical physician. The keynote of the volume is that the physician in the presence of pathological conditions shall here find what diet, how much, how often, and in what form food shall be administered to his patient.

Part I. is devoted to Foods and Food Preparations. These are classified for systematic study and ready reference. The uses, varieties, modifications, often the mode of preparation, preservation, and sources of contamination, are fully presented. Part II. treats of Stimulants, Beverages, and Condiments. Those substances which in various portions of the world have been found by their inhabitants, uncivilized as well as civilized, to be conducive to their comfort, are fairly discussed. While the alcohol question may not be presented in a way which will be satisfactory to the intemperate adherents to the theory that temperance and prohibition are synonymous terms, yet the author in fairness presents its physiological action and clinical uses, and yet does not hesitate to point out its dangers. Part III., on Cooking, Food Preparations and Preservatives, and Quantity of Food Required, should be read as an introduction to the remaining portion of the book; thus would the



mysteries of the kitchen be better appreciated and deadly work of the average cook considerably diminished. Parts IV. and V. give a fair idea of the Food Required for Special Conditions (age, weight, sex, race), and Food Digestion (conditions which especially affect digestion). Part VI. takes up the General Relation of Food to Special Diseases which are caused by dietetic errors, and here parasites, ptomaines, poisons, including alcoholic poisoning, are satisfactorily presented.

Preliminary to the application of the principles already enumerated is Part VII., on the Administration of Food for the Sick. The various forms of diet in its relation to diseases, covers three hundred pages, a monograph in itself. Infectious diseases, those of the respiratory, circulatory, urinary, and nervous system, diseases of the alimentary canal, liver, and skin, are grouped together, and full instruction is given as to the proper diet to be employed. The diseases especially influenced by diet—obesity, rheumatism, gout, diabetes, and scurvy—are by no means neglected. Here the author has bound himself to no theory, but offers the results of the best clinicians. Part VIII., on Rations and Dietaries, interests chiefly those under whose care come hospitals, reformatories, asylums, and bodies of men, and who are morally responsible for the good health of those dependent upon them. The Appendix is practically a well-arranged and useful Cook-book for Invalids, and its careful study would enlarge the *répertoire* of almost any physician. In a work requiring extensive reading, and one which must be to some extent a compilation, errors and omissions must be expected. We note the failure to quote Semmola with reference to egg-albumin (p. 468), the omission of diastase, now an article of commerce; and we find no acknowledgment of the value of a meat diet in certain cases of lithæmia (p. 487), although it is stated (p. 93) meat should be reduced or prohibited. We fail to understand why it may be desirable to peptonize Mosquera's beef jelly (p. 98). We are inclined to agree with the author that false teeth may add to the comfort and prolong the life of the aged (p. 482), rather than that they will not prove an unqualified advantage (p. 287). We find that the dose of pancreatin as given (p. 68) is incorrect; the quantities as given in the last formula, on p. 77, in both the metric and apothecaries' systems, do not correspond. We doubt if the author intends that "strachino" is to be taken as a synonym for "gorgonzola." On p. 152 undoubtedly "coleslaw" is a typographical error, for slaw may be defined as sliced cabbage, while cole, although belonging to the cabbage family, does not "head" as does cabbage. The book is well printed and easily read; the use of terminations in "our" instead of "or," following the British usage (colour, labour, favour), of unusual forms, as malfermentation (p. 67), and trichiniasis (p. 349) instead of the more familiar trichinosis, mar its appearance. The newer chemical nomenclature, sodium bicarbonate for bicarbonate of sodium (p. 631), would have been advantageously followed.

On the whole, the book shows that the author has industriously collected the best opinions upon the subject, that he has drawn from the results of his own experience, that he has endeavored to bring the findings of the laboratory into practical relation with the observations of the consulting room, and finally to produce a book of value to the practising physician. We believe that he has succeeded admirably in presenting a useful and readable book.

R. W. W.

TWENTIETH CENTURY PRACTICE. AN INTERNATIONAL ENCYCLOPÆDIA OF MODERN MEDICAL SCIENCE. By LEADING AUTHORITIES OF EUROPE AND AMERICA. Edited by THOMAS L. STEDMAN, M.D., New York City. In twenty volumes. Vol. III. New York: Wm. Wood & Co., 1895.

VOLUME III. of the *Twentieth Century Practice* contains articles on occupation-diseases, drug habits, and poisons, in the midst of which a chapter on osteomalacia is inserted, so keeping up the curious classification noticed in the earlier volumes. The first article, on Alcoholism and Drug Habits, is by Norman Kerr. In this the author attempts—unwisely, we think—to restrict the application of so well-established and commonly-used a term as inebriety “to that overpowering morbid impulse, crave or craze, which tends to drive certain individuals to excess in intoxicants.” Alcoholism is only a variety of that disease to which the term “narcomania” has also been applied by the author. The various aspects of alcoholism are well described and treatment laid down in considerable detail. The author believes in the sudden withdrawal of alcoholics in the treatment of delirium tremens, and his statement that in the workhouses of England this is the general practice carries more weight, in our opinion, than the theoretical reasons given. The author does not use any of the sedatives or stimulants popular in this country, not even hot coffee apparently, but occasionally gives a dose of opium in “incipient, slight attacks.” To cause speedy elimination of alcohol, the “innocent yet powerful liquor ammonii acetatis” is used, while hot water or hot cinnamon-water replaces the beef-tea and capsicum of former days. The author utters a timely protest against the exaggerated ideas propagated by non-medical writers, and received with curious avidity by an unthinking public. “It does not follow,” he says, “that because a child has intemperate or gouty parents, he must necessarily suffer from drunkenness or gout,” but “has a preponderating chance of never being afflicted with either disease if he is brought up and continues under conditions unfavorable to the development of either malady.” The sections on the pathological anatomy of acute and chronic alcoholism are unsatisfactory. After some remarks on ginger, eau-de-cologne, and lavender inebriety, morphinism is discussed at length. In the treatment of the latter disease the theoretical objections to the tapering-off method are not urged; on the contrary, the author recommends a gradual withdrawal extending over a term of two or three weeks or more. Cannabism, chloralism, chloroformism, etherism, and cocaineism are described with sufficient fulness, and a short section follows on the effects of gelsemium, sulphonal, paraldehyde, antipyrin, arsenic, and some other drugs, with a few words on geophagy. Tobaccoism, theinism, and caffeinism follow, after which narcomania is considered from a number of aspects, medical, legal, and otherwise, the whole forming an interesting and valuable article. Shock and collapse are described by George F. Shrady. The author prefers to distinguish between these two terms, the latter being especially applicable to the “sudden prostration occurring in cases not strictly surgical, as in internal hemorrhages, perforation of the stomach or intestine, poisoning by irritant drugs,” etc. It would be well if the distinction were more generally observed. The description of the clinical features of shock is admirable, and the direction for treatment, including prophy-

laxis, full and clear. Whiskey and brandy are looked on as of the first value; strychnine is recommended as a prophylactic, but the combined use of nitroglycerine with that remedy in shock proper is not mentioned. In a series of interesting chapters to which the term encyclopædic may with propriety be applied, Albert L. Gihon describes seasickness, heat-stroke, and frost-bite. In the former is a short section on the Therapeutic Uses of a Sea Voyage. Mountain Sickness is described in a scholarly chapter by George von Liebig, who considers the chief element of this interesting complaint to be a "temporary inability to supply the blood under all conditions with a sufficient amount of oxygen from the rarefied atmosphere." "Force of circumstances obliges persons living in high altitudes to adapt the work of respiration to the altered conditions." The remarks on treatment are rational. The chapter on Osteomalacia is by W. T. Councilman, who gives in brief compass an accurate *résumé* of our present knowledge of this rare disease. It is suggested that the relation of the ovaries to the disease, to which the results of castration point so strongly, is probably chemical. In the chapter on Diseases of Occupation, James Hendrie Lloyd has brought together from the extensive and scattered literature, from heads of great manufacturing establishments and from his own experience, a large amount of valuable information. The references to laws bearing on labor and occupation and the synopsis of the laws of a number of States regulating the labor of women and children are especially valuable. The great variety of trades and affections considered in this article makes a review of it impossible. A perusal of any part of it will furnish interesting and often valuable information, the original sources of which are inaccessible to all but a few. The volume closes with chapters on Poisoning by Beaumont Small and James Stewart. Altogether, the articles in this volume are of a high degree of excellence, and, though some of them are of comparatively infrequent practical application, all may be read and referred to with pleasure and profit. The mechanical execution of the book is good, the index short, but fairly adequate. A few typographical errors have been noticed, as, for example, the repetition of Petrona for Petrone, p. 242; Köhler for Kahler, pp. 247 and 248; Kuhne for Kühne, p. 247; Hæmoglobinuria, p. 244, should read hæmoglobin; Fruchtersleben, p. 285, should be Feuchtersleben.

G. D.

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REMOTE CONSEQUENCES OF INJURIES OF NERVES AND THEIR TREATMENT. AN EXAMINATION OF THE PRESENT CONDITION OF WOUNDS RECEIVED IN 1863-65, WITH ADDITIONAL ILLUSTRATIVE CASES. By JOHN K. MITCHELL, M. D., Physician to St. Agnes's Hospital, etc. Small 8vo., pp. 245, with twelve illustrations. Philadelphia: Lea Brothers & Co., 1895.

ONLY he who has himself tried to inquire into the later history of patients with the more chronic forms of nervous disease can appreciate the magnitude of the task so successfully accomplished by the author of the present work. The patient often drifts out of reach, or else, if his whereabouts be known, discouraged at the futility of treatment and worn by his sufferings, both he, his friends, and even his family physician



seem to have a rooted objection to giving any answers to inquiries, and, when answers are given, they are usually unsatisfactory, if not misleading. The difficulty becomes still greater when, as with most of Dr. Mitchell's cases, the patient has been subjected to the demoralizing influence of the pension agent, and he fears that any information as to his present condition will be used to decrease his pension. That, thirty years after the injury, the author has succeeded in obtaining the subsequent history of thirty-four cases of injury to the nerves, is itself praiseworthy, but the book itself merits much higher praise. The author has studied the later history of a part of the cases which formed the subject of the two treatises by Dr. Weir Mitchell, *Gunshot Wounds and Other Injuries of Nerves*, written in conjunction with Drs. Morehouse and Keen in 1864, and *Injuries of Nerves and Their Consequences*, published in 1872, and has added to the thirty-four cases recorded the histories of eighteen other cases of serious nerve injury. The book is thus a continuation and a worthy sequel of his father's well-known work. Analysis of such a work, however, is by no means easy. Each case presents its own individual features of interest, which are ably summarized. The various chapters treat of contusions and commotions of nerves, sections of nerves, ascending neuritis, degeneration and regeneration of severed nerves, and the treatment of injuries. The striking feature of the cases collected is their severity, although, of course, it was more natural that only the severe cases and those which had not recovered should answer the inquiries. Nevertheless, whether it be due to the nature of the original injury or the lack of aseptic treatment or not, cases of such duration and severity are to-day comparatively rare. The author has noted many curious examples of perverted sensibility and irregular trophic disturbances in the cases, and he urges that, before operating, we confirm the diagnosis of a nerve lesion by some symptoms other than pain. The chapter on ascending and migrating neuritis is full of value. As is well known experimental attempts to produce an ascending neuritis have seldom succeeded, but clinical cases are occasionally met with, and Dr. Mitchell has recorded several cases. He is inclined to believe that there is a special toxic cause, and he concludes that pressure from any cause is a frequent, though not a constant, factor in the production of a spreading inflammation, although the presence of inflammation in surrounding tissues has curiously little influence. Larger nerve trunks are more prone to present the phenomena of spreading inflammation than the smaller ones. Neuritis may spread centrifugally or centripetally, the latter being the commoner form in traumatic cases. Beside the cases of injury to peripheral nerves a few cases of spinal injury are also recorded, which are of very great interest from their bearing upon certain questions of great importance in medico-legal cases. They go to swell the proof that there are cases of very slow onset, due to injury, when the lesion is in the cord itself, with no injury to the vertebrae, and where the prognosis is grave, and they further show that some of the simple "backs," viewed with so much disfavor, may eventually develop into cases of cord disease. The author finally lays much stress on the importance of very long-continued treatment in cases of nerve injury, especially by electricity, even in apparently hopeless cases. In cases of suspected local injury or pressure he strongly urges nerve suture. In only one point can we take exception to his statements, when he speaks of the prognosis in the ordinary radial paralysis from pressure so com-

mon in drunkards, as bad, since complete and speedy recovery has been the rule in our experience.

The book will prove of extreme value to all interested in the study of nervous disease. The author has undertaken a novel task, and he has performed it most admirably. We can give it no higher praise than to say that it is a worthy sequel of the elder Mitchell's *Injuries of Nerves*.

P. C. K.

THE ASEPTIC TREATMENT OF WOUNDS. By DR. C. SCHIMMELBUSCH, of Berlin. Translated from the second German edition by ALFRED THEODORE RAKE, M.B., of London. London: H. K. Lewis, 1895.

AN English translation of this most excellent work meets an undoubted need, a need not only of the student who is seeking to grasp principles, but also of the practitioner who is endeavoring to apply them, and of the teacher who explains and demonstrates. The first German edition obtained at once a high place in the estimation of surgeons, and a second edition was demanded in a few months.

Schimmelbusch was widely known as a scientific investigator of acumen and learning and as a practical surgeon of skill and experience, a blending of capacities in the individual which gives a union of forces in his book. This volume is characterized by comprehensive grasp, breadth of view, and scientific accuracy. There are no vain chases after elusive theories. The results of the laboratory investigation are gauged, checked, weighed, and systematized by the calm judgment of the practical surgeon, a judicious fusion of theory and practice which renders this little book the most valuable exposition of the subject we have ever seen.

Schimmelbusch shows the great results which asepsis and antisepsis have brought about, demonstrates that the goal to aim at is surgical cleanliness, and that in reaching this chemical germicides are of less importance than mechanical means. He gives in detail descriptions of the simplest and best methods of preparing instruments, ligatures, sutures, dressing the skin of the patient, and the hands of the surgeon and his assistants; outlines the methods of preparation for operations in each region of the body; gives examples of preparation, operative conduct and post-operative care; outlines the procedures suitable for emergencies; insists upon thoroughness in every move, and proves that hypodermatic injections carelessly administered may be productive of most disastrous consequences. Every surgeon should own this book and every surgeon ought to study it.

J. C. DA C.

TEXT-BOOK OF DISEASES OF THE KIDNEYS AND URINARY ORGANS. By PROF. DR. PAUL FÜRBRINGER, Director of the Friedrichshain Hospital, Berlin, etc. Translated from the German with annotations by W. H. GILBERT, M.D., Physician in Baden-Baden, etc. In two volumes. Vol. I. London: H. K. Lewis, 1895.

PROF. FÜRBRINGER'S work on the Internal Diseases of the Urinary and Genital Organs, the first edition of which appeared in 1884, the second in 1890, acquired its popularity chiefly through the later chapters, on the disease of the bladder and genital organs. The part

now translated from the second edition is distinguished by the skill with which the author has compressed into a small and readable form a large amount of matter, so presenting not only sketches of the views of most of the classical writers on kidney disease, but in every chapter giving the results of his own extensive clinical experience. That the last edition was prepared five years ago renders the work somewhat incomplete in a few minor points of anatomical interest, but the chapters on diagnosis and treatment do not suffer from the lapse of time.

The work begins with an account of albuminuria, hæmaturia, hæmoglobinuria, casts, dropsy, and uræmia, which is on the whole satisfactory. Following this is a chapter on the renal alterations in Asiatic cholera and in pregnancy, congestion of the kidneys, and infarct. The various forms of nephritis are classified as follows: Diffuse nephritis, including acute nephritis, acute hyperæmia, and febrile degeneration; chronic nephritis without marked atrophy; chronic nephritis with marked atrophy and true contracted kidney; amyloid kidney; circumscribed (suppurative) nephritis. The author does not follow the old plan of speaking of the "stages" of nephritis, but considers the anatomical varieties under the classification mentioned. Under each form the etiology, morbid anatomy, symptoms, and complications are fully discussed. The treatment of acute nephritis is considered with that of the chronic diffused form, and is characterized by rational and conservative views. In the symptomatic treatment of contracted kidney Fürbringer rejects many remedies looked on with favor in America, such as nitroglycerin. His advice, "not to forget the poor patient through thinking of the remedy," is worth noting. The English volume ends with a short chapter on renal abscess. The translator does not explain why this is included in the first volume, while floating kidney, enuresis nocturna, and several other diseases often classified as internal are reserved for the surgical volume.

On the whole, the idea of presenting to English readers a work like that of Fürbringer is praiseworthy; we regret that the mode of presentation is not equally good. Sentences are omitted and the paragraphing arranged after a new method. Other sentences are so translated as to convey precisely the opposite meaning from that of the original. The book abounds with specimens of "English as She is Wrote," which might be explained, but not excused, had the book been printed, as well as translated, in Germany. How some of the errors could escape English printers is a mystery. In order that these remarks may not be ascribed to national idiosyncrasy we submit a few examples: "Permanent and uniform" becomes "intransmutable regular;" "albuminuria through disease;" "monography;" "albuminous cyclus" (for "cyclical albuminuria"); "Pavy's illness" for "Pavy's disease;" "illness of the urinary organs;" "albuminuria produced by wind instruments;" "spectrum" becomes "spectre;" "hæmoglobinuria has been described as (*nach*) a fat embolism;" "slide" is "object-glass;" "tubes" are "utriculi;" "related" is "affinate;" "clonic" is always "chronic;" "cliniker" is always "cliniater;" "picture" (*Bild*) is "allures;" patients treated by the "transpiration procedure" (*Schwitzbad*) are likely to complain of "caducity!" Curiously enough, actual typographical errors are very rare; even Hallibarton (p. 37) is so spelled in the original. There is a short table of contents, but no index. Needless to say the work cannot be recommended to serious-minded purchasers.

G. D.



# PROGRESS OF MEDICAL SCIENCE

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## THERAPEUTICS.

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UNDER THE CHARGE OF

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### THE TREATMENT OF PNEUMONIA.

DR. GEORGES HAYEM states that amyl nitrite in large doses is much less dangerous than it is commonly supposed to be. It transforms hæmoglobin in the globule itself into methæmoglobin without destroying the anatomical elements, without giving rise to globular anæmia or alteration of the blood by globular *débris*. At a single *séance* an adult can inhale, from a compress held half an inch from the nose, 60, 80, or even 100 drops. In many cases a single inhalation may be sufficient; in others two daily, morning and evening. This treatment is harmless, and can be continued during the course of the disease, and for two or three days after complete defervescence. It does not change the duration of the disease nor the temperature range. It relieves the dyspnœa, liquefies the expectoration, and diminishes the auscultatory signs. It does not possess any anti-pneumococcal properties. It is probable that the lung undergoes a marked sanguineous fluxion. At all events the heart is violently excited, its beats become stronger and more rapid, and the vasomotor effect results in facilitating the re-entrance of blood through the pneumonic areas and the absorption of the exudate.—*Journal des Praticiens*, 1895, No. 16, 2d semestre, p. 254.

DR. ERNST GLAES quotes the enthusiastic *dicta* of Sziklai in regard to pilocarpin and reports five cases. He concludes that (1) in recent cases doses of from one-sixth to one-third of a grain give rise to symptoms of collapse. In some instances there is a rapid extension of the process and curative action in acute cases cannot be demonstrated, and its use is not to be encouraged especially in private practice. (2) In delayed resolution the remedy can be given in single doses of one-sixth to one-third of a grain twice or thrice daily and for five or six successive days, either internally or subcutaneously, without marked unpleasant after-effects. In this stage it may

bring about a somewhat rapid resolution, but in many cases it will fail. Cardiac weakness is a contraindication to its use.—*Centralblatt für die Gesamte Therapie*, 1895, Heft x., S. 577.

#### THE ACTION OF EPHEDRA.

DR. E. GRAHE notes that the similar but not entirely identical bodies, the alkaloids ephedrine-Nagai, pseudo-ephedrine-Merck, and ephedrine-Spehr possess the following action: (1) Small doses, *per os*, subcutaneously or intravenously applied, give rise to transient increase of blood pressure, slowing of the cardiac contractions with coincident increase at the beginning, and weakening of the latter as the result of a paresis of the vagal termination, and probably also of the smooth muscular fibres of the heart itself. (2) Larger doses give rise to a lowering of blood-pressure consequent to the diminution of vascular tone. (3) As constant phenomena are pupillary dilatation with disturbances of accommodation and refraction, which are probably the result of irritation of the sympathetic, and also to a less degree, of a slight paresis of the terminations of the motor oculi in the sphincter pupillæ, and finally also possibly of a paresis of the muscular apparatus of the iris itself.—*Therapeutische Monatshefte*, 1895, Heft x., S. 556.

#### DIASTASE.

DRS. E. B. SMITH and E. W. TONKEN report very briefly seven instances in which taka-diastase was employed with very satisfactory results in five. The conclusions are that (1) diastase was suited for cases presenting, especially after taking much starchy food, the following symptoms: epigastric weight and pain, bloating, drowsiness, frontal headache, with a superadded constipation. (2) The dose may be smaller than indicated (5 grains), it being found that from  $\frac{1}{4}$  to 3 grains are sufficient. (3) It should be given just before or after eating, or it may be mixed with food. (4) It relieves the constipation of these cases in this manner: A colloid-like unconverted starch prevents watery osmosis into the intestine; but when this same starch is converted into sugar it acts more after the manner of a crystalloid and sets up osmosis of liquids into the intestines, thus aiding the evacuation of the contents.—*Therapeutic Gazette*, 1895, No. 10, p. 670.

#### STRONTIUM CARBONATE.

M. E. MÉTRAL proposes this salt, hitherto unused in medicine, as a dentrifice. (1) Its detersive power is midway between that of calcium and magnesium carbonates, whose action is very slight, and that of pumice-stone, which can abrade the teeth if the enamel is of poor quality. (2) Its reaction is slightly alkaline; an advantage, for acidity is the initial cause of caries. (3) Its use is agreeable because its oily condition causes it to attach itself to the brush and to the teeth, so that it does not get into the throat and cause tickling, cough, or even nausea. (4) It is very reasonable in price. (5) The strontium salts appear to have a preservative and anti-putrid action upon the tissues, liquids, and organic excreta. The salt can be used alone, but it is better associated with an anti-fermentable substance, as flowers of sulphur,

as follows: Strontium carbonate and flowers of sulphur, of each, 37; essence of rose, 1. For a paste: Strontium carbonate, 12; flowers of sulphur, 6; medical soap, 27; essence of rose, 1; with equal parts of mucilage of acacia and glycerin sufficient to make a paste—*Bulletin Générale de Thérapeutique*, 1895, 40 liv., p. 360.

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#### THYMOL IN SOLUTION.

DR. HERMITE calls attention to the fact that the large amount of alcohol required to dissolve this drug will render its solution painful and as well make it more expensive. By dissolving in a little water, slightly warmed, equal parts of tartaric acid, caustic soda, and thymic acid, and adding water to 2000 parts, a colorless and perfectly limpid solution is obtained.—*Bulletin Générale de Thérapeutique*, 1895, 36 liv., p. 266.

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#### THE ANALGESIC ANTIPYRETICS.

M. SCHMIDT calls attention to the fact that the association of the antipyretic and antineuralgic effects is not a new thing, for Briquet, in 1842, showed that quinine, in large doses, relieved articular rheumatism. In the study of these agents one must consider their action: (1) upon the nervous system; (2) upon the arrest of protoplasmic activity; and (3) upon the blood. These drugs can be divided into six groups: (1) The phenols—represented by carbolic acid, thymol, guaiacol (creosote-phenol), naphthol, asaprol (beta-naphthol sulphonic ether). These bodies act upon microbes, are protoplasmic poisons, alter organic cells, and restrain chemical processes. They are blood-poisons, because they lower its vitality in destroying its figured elements; and they are nerve-poisons, because they depress or paralyze after a period of excitation which is rarely found wanting. Their analgesic effects are feeble, although their antipyretic effects are very active; and although they are transient, they are accompanied by grave secondary phenomena. Naphthol and asaprol are harmless; but the former is insoluble, and the latter is of so stable a combination that naphthol is disengaged only in small quantity. (2) The aromatic acids—salicylic, benzoic, and anisic. With salicylic acid must be considered salol and betol, whose action is uncertain, for they can be absorbed only after splitting up by the pancreatic fluid whose secretion is very inconstant in febrile conditions. In this group the antiseptic action predominates and they are less poisonous as regards protoplasm; their action upon the blood is insignificant when used in therapeutic doses. In very large doses, which first excite, they may later paralyze the nerve cells. Outside of rheumatism their analgesic action is weak; their antipyretic action demands considerable doses; they facilitate diuresis and make soluble the nutritive waste which embarrasses the blood in fever; they are real purifiers of the economy. (3) The anilides. This group comprises acetanilid, exalgin, formanilid, methyl-formanilid, and phenacetin. The substances break up in the organism into paramidophenol, or compounds of this substance, which is eliminated in the condition of sulphur compounds. The anilides are more poisonous for the blood than the derivatives of paramidophenol, although this is a blood-poison, transforming



hæmoglobin into methæmoglobin, and ending by destroying the blood-globules themselves. A quite energetic antiseptic, it acts upon the nervous system in a way analogous to the phenols, but more slowly and less intense. It excites at first, then paralyzes the central nervous system. When given to man it produces a rapid but temporary fall of temperature, accompanied with abundant perspiration, chilly sensations, cyanosis, and hæmoglobinuria. It markedly alleviates painful phenomena. (4) Phenyl-hydrazin. This substance is an energetic reducer. It lowers temperature, but it cannot be employed on account of its violent action upon blood-globules. (5) Quinolin. This is considered as the nucleus of the majority of the natural alkaloids, especially of quinine, and Danoth believed that it possessed antiseptic properties, an antifebrile action, and paralyzing effects upon the nervous system, but it has been abandoned because it irritates the alimentary canal. (6) Pyrrol. The most important and almost the only representative is antipyrin, to which may be added the compounds salipyrin and tolypyrin. The first possesses a real antifermentative and microbical action, is almost harmless to the blood, presents antithermic and analgesic properties which are not in any respect inferior to those of similar remedies. As analgesic, antipyrin holds the first place in point of rapidity of action and harmlessness, next comes phenacetin, less constant and less rapid. Exalgin and acetanilid are without doubt more active, but they are dangerous. They can be used for inveterate neuralgias if other remedies have failed.

M. LABORDE, from the standpoint of antipyretic and antithermic aspect, would divide the substances into two categories. The first comprises the fundamental analgesics, of which the types are antipyrin and acetanilid; but these can, under certain conditions, act upon the pyrexias especially of the continued type. Second, the true antithermics and antipyretics, which are also antiperiodics, such as quinine, and synthetic derivatives, as quinethylin and quinopropylin. One definite physiological law can be deduced, viz., every thermic moderator is necessarily a moderator of the sensitive nerve acts. Therefore the mode of action of these substances can be stated as follows: (1) The action of the antithermics is first and mostly upon the centres of sensory reception and perception. (2) It then follows that the organic centres which preside over the production or repartition of animal heat appear to be mingled. (3) We should beware of forgetting the narrow correlation which exists between the trophic phenomena and those of sensibility.—*Les Nouveaux Rémedes*, 1895, No. 18, p. 109.

#### THE TREATMENT OF EPILEPSY BY FLECHSIG'S METHOD.

DR. ISABEL M. DAVENPORT has made a careful and thorough trial extending over a period of more than a year. The treatment consists of opium given in one-half-grain doses, and increased by the same dose per day until fifteen grains are reached. Then the opium is discontinued and the mixed bromides, thirty grains four times each day, were substituted. Eleven patients were treated. The author concludes that: (1) The treatment does not result in recovery. (2) That it is of benefit in that it gives many of these unfortunates a gratifying respite from the attacks, and thus adds to their comfort. (3) That it is soothing and quieting to the irritable patients and exhilarating to those suffering from depression, thus relieving distressing

symptoms in both cases. (4) That through the cessation of the seizures and other annoying symptoms the patient is enabled to enjoy something of life in general and to recuperate physically, and for these reasons I believe it is desirable to repeat it at intervals of two or three months, if thereby we can obtain the results mentioned above.—*American Journal of Insanity*, 1895, No. 2, p. 207.

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#### THE TREATMENT OF SYPHILIS.

DR. MOREL-LAVALLÉE regards as provisionally demonstrated the following propositions: (1) Mercury should be the foundation of the treatment; potassium iodide is a useful accessory agent of medication. (2) The mercurialization ought to be initial, prolonged, and of sufficient dose for giving to the future a relative security. (3) The case in which the mercurial treatment has been abandoned before the end of the second year is one insufficiently treated. (4) Mercury has a preventive action against all the manifestations of the disease; the proof of this is, for example, the constantly favorable action of mercurial treatment administered with the purpose of avoiding the hereditary manifestations in the descendants of syphilitics. In case of absolute mercurial intolerance one may be forced, in default of better, to have recourse to the iodides, even in the secondary stage.—*Revue de Thérapeutique*, 1895, No. 21, p. 651.

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#### SEVERE MANIACAL EXCITEMENT FOLLOWING THE ADMINISTRATION OF SODIUM SALICYLATE.

DR. G. B. ROBINSON reports that a single woman, forty years old, who had been an inmate of an asylum for eighteen months suffering from delusional insanity, received six twenty-grain doses of this drug at four-hour intervals to relieve a subacute rheumatism which was principally located in her wrist-joints. She became restless, incoherently talkative, more excited and delirious, using disgusting and immoral expressions, and requiring the constant attention of two nurses. Recovery from these symptoms, after the use of whiskey, milk, and eggs, took place within thirty-six hours.—*Journal of Mental Science*, 1895, No. 139, p. 685.

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#### THE TREATMENT OF OPIUM-POISONING.

DR. LEEDOM SHARP, from elaborate investigations upon potassium permanganate, concludes: (1) That the susceptibility of lower animals to the action of morphine renders experiments on them very unsatisfactory in arriving at any results referable to man. (2) That the dose necessary to counteract the enormous lethal dose of morphine in the lower animals must of itself prove fatal. (3) That its exhibition by the stomach or hypodermatically has a marked influence in prolonging the life of rabbits poisoned by morphine. (4) That its action, when given separately from and not immediately following the dose of morphine, is not chemical, because (a) there is no proof of a chemical action to be deduced from the cases or experiments; (b) there is evidence that it does not act chemically. (5) Its action is physiological, because (a) there is no proof that it acts chemically, except when

brought in direct contact with the stomach. (b) There is evidence that its exhibition, by the stomach, or hypodermatically, increases the number of respirations. (c) There is evidence that its exhibition, by the stomach or hypodermatically, has an appreciable effect upon the circulatory system, as seen by the dilatation of the vessels of the ears and by the direct effect upon the blood. (6) It is not a reliable antidote, because (a) there is no proof that when it is given after the absorption of the morphine, it is, *per se*, a reliable antidote. (b) There is evidence that when it is given after the absorption of the morphine it is an unreliable antidote. (c) There is proof that when it is given after the absorption of the morphine it has no apparent effect. (7) It, like strychnine, caffeine, and atropine, has some valuable properties, useful in the treatment of morphine-poisoning, but as yet undetermined. "Proof" and "evidence" are not intended to be synonymous, the former being positive, the latter relative.—*Therapeutic Gazette*, 1895, No. 10, p. 561.

He also reports on the value of caffeine, as shown in a single case, male adult, who had swallowed fifteen grains of Dover's powder. Two hours after ingestion, an emetic not being at hand, he received  $\frac{1}{80}$  of a grain of nitroglycerin, 4 minims of tincture of digitalis, 4 minims of tincture of strophanthus, and 5 minims of tincture of belladonna. In less than twenty minutes the pulse improved greatly in character. Now 6 grains of caffeine were given with great improvement in coma, pupils, pulse, and respirations.—*Ibid.*, 1895, No. 11, p. 732.

#### THE DANGER OF CARBOLIC ACID IN ENEMATA.

DR. HERLYN reports a single case where a 3 per cent. solution of carbolic acid was used as a rectal by mistake for a vaginal injection. Fainting followed, the respiration was superficial and slow, the pulse 30 to 35 per minute, there were isolated clonic spasms, and the pupils were without reaction. About seven ounces of the solution, containing ninety grains of carbolic acid, had been used. After repeated injections of ether the pulse became stronger and the patient recovered consciousness, the night was restless, there was a profuse muco-sanguinolent diarrhoea and the stools were of the odor of carbolic acid; the urine was not characteristic. Recovery followed in five or six days.—*Deutsche medicinische Wochenschrift*, 1895, No. 41, S. 683.

#### IMMUNIZATION AGAINST DIPHTHERIA.

DR. GEORGE A. PECK reports from the Mount Vernon branch of the New York Infant Asylum: After a period of twenty-one months free from the disease a patient was attacked after a residence of twelve days. From this came other cases until within a little more than six months there were twenty-two cases with fifteen deaths. The number of cases now began to increase until for three successive months there were in each month thirty or more cases. At about the middle of the last month forty-two children whose throats contained the [Klebs-]Loeffler bacillus were selected and removed to one of the buildings, and to one-half of this number 150 units of Behring's antitoxin II. were given. No cases of diphtheria developed in either series during one month, but at the expiration of that time one of the boys who had received an injection of antitoxin was attacked by the disease. In the meanwhile the



epidemic was persisting among the other children, and about the middle of the month two hundred and twenty-four children were inoculated with the same serum, 100 to 200 units, according to age. Among these cases there appeared seven cases of diphtheria. Six weeks from the time of the last, a second general inoculation was given, and two hundred and forty-five children received the Board of Health antitoxin, 125 to 225 units. From this inoculation there was a period of complete immunity for over four and one-half weeks. The antitoxin apparently exerted no influence upon the bacillus itself. The ill-effects from the antitoxin were limited to a few cases of pronounced urticaria after both general inoculations, and a few needle abscesses after the first, consequent upon haste. Constitutional symptoms with temperature, etc., were almost *nil*.—*New York Medical Record*, 1895, No. 1276, p. 486.

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#### ACETANILID-POISONING.

DR. RANDLE C. ROSENBERGER reports a single case, an Italian child, sixteen days old, suffering from hemorrhage from the umbilicus. A paroxysmal cough made the hemorrhage worse. A powder of equal parts of boric acid and acetanilid was to be locally applied twice daily. Three days after the face was distinctly cyanotic, the lips, ears, finger-tips, and toes bluish, the hands and feet cold, the breathing bordering upon stertor. The powder was discontinued and  $\frac{1}{300}$  grain of strychnine sulphate with ten drops of brandy in water were given four times daily. Within forty-eight hours the cyanosis had disappeared, the hands and feet were warm, the child was much brighter, and the hemorrhage had not recurred.—*The Philadelphia Polyclinic*, 1895, No. 45, p. 460.

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#### THYROID FEEDING.

DR. LEWIS C. BRUCE reports a second series of sixty cases. The majority of cases chosen for treatment were unfavorable, and all had received, without apparent benefit, the best dietetic and therapeutic treatment which the Royal Edinburgh Asylum could give. There were several most gratifying results in the shape of recoveries, where patients threatened to pass into confirmed dementia, or had remained stuporous for long periods, as in one case of two years' standing. Whether its action is due to the febrile process induced by the thyroid and the subsequent reaction to the fever, the answer is made that the actual and visible result of thyroid feeding has all the appearance of a condition induced by a toxin introduced into the blood through the medium of the mucous membrane of the stomach, and it undoubtedly produces a mild feverish condition, the action and reaction to which is often of considerable benefit to the patient. It is also a direct cerebral stimulant which may prove to be an advantageous treatment in cases whose higher cortical cells remain in an anergic condition after acute attacks of insanity. There is also strong probability that at some periods of life the administration of thyroid supplies some substance necessary to the bodily economy.—*Journal of Mental Science*, 1895, No. 139, p. 636.

DR. WILHELM KNOEPFELMACHER has made use of thyroid extract in tablet form in twenty-two cases of struma. The duration of the treatment

varied from six weeks upward. In eleven cases there was marked diminution even to complete disappearance. In five others there was considerable but not so marked improvement. In the remaining cases the treatment was without result. In the five cases in which the treatment was only partially successful, potassium iodide internally and iodine ointment externally also failed. Four patients, who were seen from three to five months after the cessation of treatment, were found to be in the same condition as at its close. The explanation being apparently that in hyperplastic struma the gland substance functionally hypertrophies, and upon the administration of the extract this hypertrophy retrogrades, provided that secondary changes have not supervened.—*Wiener klinische Wochenschrift*, 1895, No. 41, S. 715.

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#### THE TREATMENT OF ZONA.

M. ALBERT ROBIN commences with the administration of a saline purgative, preferably sodium sulphate. For the eruption it is essential that it be kept dry. The application recommended, which will also relieve the pain, is composed of powdered starch, 60; zinc oxide, 15 to 20; powdered camphor, 1 to 3; and finely powdered opium, 1 part. In old people the eruption should be closely watched to prevent ulceration. The neuralgia which precedes and accompanies the eruption is treated by four pills daily, each containing one-sixth of a grain of extract of datura stramonium and extract of gelsemium, and one-twelfth of a grain of extract of belladonna. If these pills should fail antipyrin is to be substituted. For the neuralgia consecutive to the eruption subcutaneous injections of antipyrin are employed, or those of sodium glycero-phosphate.—*Bulletin général de Thérapeutique*, 1895, 40 liv., p. 358.

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#### THE TREATMENT OF LUMBAGO.

M. ALBERT ROBIN mentions the various local applications with friction which have been used from time immemorial, revulsives, counter-irritants, and wet-cups. Of the applications, massage of the joints, electricity, particularly for the secondary muscular atrophy, and methyl-chloride for the acute stage, are especially mentioned. For the internal treatment jaborandi is most strongly recommended. As contra-indications to its use should be cited disturbances in the cardiac rhythm, and it should be omitted if epistaxis or the quantity of urine does not reach the normal amount after diaphoresis. The method of preparation is as follows: Sixty grains of the leaves are macerated for twelve to twenty-four hours in two and one-half drachms of alcohol. Upon this mixture is poured one and one-half ounces of boiling water, which is infused for twenty-four minutes and then filtered. The filtrate is taken hot, as it is prepared, in the morning, fasting. During the perspiration the patient should avoid swallowing the saliva, which may give rise to nausea or even to vomiting, and for the thirst he should drink only a small quantity of warm liquids, diluted coffee, in order to avoid the vomiting which follows the immoderate ingestion of cold liquids or the swallowing of a certain quantity of saliva. There are instances when a single dose of the remedy will cure the disease. In case it is necessary to repeat the treatment, it is well to have a day of intermission between the doses.

The patient should be kept warm, confined to his room or even in bed. In case that this remedy is contraindicated, sodium glycero-phosphate, five to seven grains, hypodermatically can be substituted. In certain cases when the articulations are affected sodium salicylate may be of use, but it is not so valuable as is jaborandi.—*Bulletin général de Thérapeutique*, 1895, 36 liv., p. 241.

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MEDICINE.

UNDER THE CHARGE OF

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AND

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ALCOHOLIC MYOCARDITIS.

AUFRECHT (*Deutsches Archiv für klin. Med.*, Bd. liv. p. 615) calls attention to a class of cases not hitherto recognized. The disease usually occurs in men between the ages of twenty-five and fifty, but in one case appeared in a man nineteen years old. Brewers and inn-keepers form a large proportion of cases; women are rarely affected. All the patients admit excessive use of alcoholics. That all who indulge in the same way are not affected may be due to mode of life, to exercise, temporary periods of abstinence, or other unknown causes. The disease begins gradually. Most patients in the beginning are well nourished. The first symptom is dyspnoea, which may be noticed in talking; in more advanced stages on climbing stairs. A feeling of pressure in the heart region is not uncommon. The patients are usually able to continue their business, especially when it does not involve severe bodily labor. On account of the course of the disease the heart—the organ first affected—is rarely examined in the earliest stages. Cases examined at such times show an enlargement of the cardiac dulness, rarely a murmur. Aufrecht considers the lesion in the heart to be at first dilatation from the effect of the alcohol on the muscle; this is followed by hypertrophy of the muscular fibres and their nuclei, increase of connective tissue, thickening of the smaller arteries with increase of nuclei in their walls, and, finally, fragmentation of the muscle-fibre. For these lesions Aufrecht prefers the term at the head of this article. At an early period of the disease the liver is enlarged, perhaps on account of the dilatation of the heart, though the author thinks more probably from inflammatory changes due to alcohol. Later, cirrhosis occurs, either atrophic or hypertrophic; in some cases there is peri-hepatitis. Congestion of the kidneys also occurs, with temporary albuminuria. In one case uræmic mania with albuminuria gave the first indication of the kidney affection, the attack being brought on by a wine-dinner. In another case there was temporary diabetes. Alcoholic myocarditis was at



first mistaken for nephritis, and it was only by prolonged observation of favorable cases that Aufrecht came to the conclusions indicated in this paper. According to him not beer alone, but other alcoholics, even wines, are dangerous.

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#### FATAL VARICELLA.

CASSELL (*Archiv für Kinderheilkunde*, Bd. xvii. p. 371) makes an addition to our knowledge of the dangerous complications of chicken-pox. Five out of twelve cases treated in his polyclinic had albuminuria or nephritis. All the patients were from the poorer classes, between the ages of five months and three-and-a-half years. The albumin appeared after desiccation, not earlier than the fourth or fifth day. Three of the patients died, albuminuria continuing to the last. In the other cases albuminuria was of brief duration. In one of the fatal cases, a previously healthy child treated under unfavorable hygienic conditions, the vesicles became gangrenous and ulcerated.

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#### THE CAUSES OF CARDIAC WEAKNESS IN INFECTIOUS DISEASES.

ROMBERG has endeavored to discover whether certain cases of heart-failure are due to an affection of the cardiac muscle or of the vasomotors. As fall of blood-pressure occurs in either case, the estimation of the pressure alone throws no light on the question. By abdominal massage, or by compression of the descending aorta above the diaphragm, the work of the heart is increased. If the heart-muscle is sufficient the pressure then rises. On the other hand, certain vascular reflexes after irritating the skin or mucous membranes increase the blood-pressure, but only when both heart-muscle and vasomotors are competent. By taking advantage of these facts it is possible to ascertain whether, in an acute infection, either heart or vasomotors, or both, are affected. It was found that the blue-pus bacillus and the pneumococcus of Fränkel paralyze the vasomotor centres in the medulla; the peripheral vasomotors and Goltz's centre remain intact. The pneumococcus does not affect the heart, which retains its efficiency to the last, even for some time after vasomotor paralysis. In the human subject weak heart is dangerous, because, if the disease in the lung is extensive, the right heart is overburdened, or, in other cases, because the heart cannot compensate for the fall of pressure due to vasomotor paralysis. (From the sixty-seventh meeting of the German Naturalists and Physicians. *Centralblatt für innere Med.*, 1895, No. 40.)

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#### CHANGES IN THE SPINAL CORD IN CHRONIC DISEASES.

At the recent meeting of German Naturalists and Physicians (*Centralblatt für innere Med.*, 1895, No. 40) LUBARSCH called attention to the occurrence of degeneration in the posterior roots and posterior columns of the spinal cord in cancer of the stomach. He had found the degeneration in six cases. Lubarsch attributed the changes not to anæmia, nor to the action of specific cancer toxins, but to the effects of toxic substances formed in the gastrointestinal contents.

SCHULTZE spoke of similar changes occurring in a number of chronic diseases, such as tuberculosis. The relations are not clear; perhaps the condi-

tion is simply due to malnutrition. The localization in the posterior columns has not been explained, except on the ground that those columns are predisposed to degeneration.

#### EROSION OF THE STOMACH.

EINHORN (*Berliner klin. Wochenschrift*, 1895, Nos. 20 and 21) has observed seven cases in which small bits of gastric mucous membrane were constantly present in the water returned in the lavage of the empty stomach. Mechanical abrasion by the tube could be excluded. In one case the water was tinged with blood. In one case there was increase, in the others decrease of hydrochloric acid. Symptomatically the cases presented pain in the stomach, lasting one or two hours after meals, emaciation, and a feeling of weakness most marked after eating. The course was chronic, but interrupted by periods of health. Symptoms of ulcer never appeared, so that the idea that erosions, such as were undoubtedly present in these cases, represent the beginning of round ulcer, is not borne out by Einhorn's observations. The author looks on the process as due to chronic catarrhal inflammation. Treatment consisted in the use of the stomach-douche with a spray attachment, in which  $\frac{1}{2}$  per cent. solution of silver nitrate was used. Direct galvanization, nux vomica, condurango, and iron were also used.

#### INDURATIVE MEDIASTINO-PERICARDITIS.

THOMAS HARRIS (reprint from the *Medical Chronicle*, 1894-95) has tabulated and analyzed the histories of cases of chronic inflammation of the mediastinum and pericardium in which post-mortem examinations were made, including three cases observed by himself. He was able to find records of twenty-two cases of chronic mediastino-pericarditis and three cases of non-suppurative inflammation of the mediastinum. Of the former, two varieties can be distinguished. In one there is adhesive pericarditis and marked increase of fibrous tissue in the mediastinum. At the same time there is adhesion of the pericardium externally to neighboring tissues, "a condition which is accurately termed indurative mediastino-pericarditis." In the other form there is adhesive pericarditis, with thickening of the sac and adhesion to surrounding parts, but little or no general mediastinitis. This is sometimes called pericarditis interna and externa. The two varieties have been confused by authors—a fact of minor importance, since the distinction can rarely be made during life. Of the twenty-two cases, nine were under and thirteen over eighteen years of age, only two were over thirty. The youngest of the three cases of chronic mediastinitis was thirty-seven years of age. There were seventeen males, five females. Exciting causes could not be accurately determined. In many cases the onset was insidious. Traumatism was rarely alleged as a cause. Of the physical signs noted the most frequent are dyspnoea, venous engorgement, cyanosis, enlargement of the heart and liver (not usually of the spleen), ascites or anasarca, pulsus paradoxus, and inspiratory swelling of the cervical veins. These are not always present in every case. The posture described by Jaccoud as characteristic, in which the patient sits bending forward, is not generally assumed. Dyspnoea increases as the disease advances.

The author considers the causes of various symptoms of the disease. The pulsus paradoxus, formerly considered pathognomonic, is seen occasionally when the mediastinum is not affected, as in different forms of pericarditis, large pleural effusions, great cardiac weakness, convalescence from long-standing febrile affections, mitral regurgitation with dilatation, stenosis of the air-passages, or even in health; and mediastino-pericarditis may exist without pulsus paradoxus. The duration of the disease varies from a few months to several years. The cause of death is usually gradual dilatation of the heart, often complicated by pneumonia, pleurisy, or tuberculosis.

The cases of the author are illustrated by figures, showing the physical signs and reproductions of the post-mortem appearances. A useful bibliography adds to the value of the work.

#### THE KNEE-JERK IN PSYCHIATRY.

At the last meeting of the Verein der deutschen Irrenärzte (*Neurologisches Centralblatt*, 1895, No. 19, p. 880) CRAMER reported some results of the study of 2384 cases, from which the following conclusions, among others, were drawn: Progressive paralysis is the only form of insanity with a definite relation of the knee-jerk in a certain proportion of cases. Absence of the knee-jerk in cases of insanity in which alcoholism, exhausting excitement, and severe lesions of the nervous system can be excluded should arouse suspicion of general paralysis, and is therefore a symptom pointing to bad prognosis. In the convalescence of mania, or in chronic mania, or in the acute forms of paranoia, and in alcoholic psychoses absence of the knee-jerk is only of bad prognosis when signs of extreme collapse are present. Increased knee-jerk is only of bad prognosis when combined with advanced idiocy, or symptoms of general paralysis. Increased knee-jerk is only rarely important in differential diagnosis. In the course of chronic paranoia increase of the knee-jerk with other symptoms points to an exacerbation. Neurasthenia seems always to be accompanied by increased knee-reflex. Cases of general paralysis with absent knee-jerk seem to have a longer course with more marked depression, and with rare periods of excitation. Absence of the knee-jerk after epileptic attacks allows the exclusion of simulation.

SMITH called attention to the great value of Sommer's instrument for registering the knee-jerk.

MENDEL said that he had failed to get the knee-jerk in only one case of functional psychosis. In this case, one of apparently recent mania, the patient recovered, but in two years proved to be parietic. Mendel prefers the terms "strong" and "weak" to "increased" or "decreased," as applied to the knee-jerk.

#### NON-PERFORATIVE PNEUMOTHORAX.

LEVY reports "the first accurately observed case of so-called spontaneous pneumothorax." A previous healthy man of forty-eight years was aspirated five times in the course of two months for pleurisy, with an extensive serous exudate. A week after the last puncture signs of pneumothorax developed. Aspiration and costal resection were followed by death in one month. Au-



topsy showed an old caseous apical focus; miliary tuberculosis; fibrinous pleurisy; no signs of perforation.

Bacteriological examination of the serous exudate showed in anaërobic cultures a short, thick, non-motile bacillus, which produced gas. Cultures of this killed guinea-pigs, with gaseous exudate at the point of inoculation. The same bacillus was found by the author in a case of parametric gas-abscess, and was cultivated from four cases of gas-abscess by E. Fränkel. (*Arch. für exper. Path. und Pharmacol.*, Bd. xxxv. H. 4 und 5.)

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#### ANALGESIA OF THE ULNAR NERVE.

BIERNACKI found, some time ago, that the unpleasant sensation produced in healthy persons by pressure on the trunk of the ulnar nerve in the ulnar groove is often absent in tabes.

CRAMER examined the matter in cases of mental disease, and found that in the non-paralytic insane the reaction was more or less distinctly present in three-fourths of all cases, but that in thirty-nine out of fifty-one paralytics, or 76 per cent., there was ulnar analgesia on both sides.

SNELL has recently examined one hundred cases, including twenty-five paralytics, but without such striking results as those of Cramer. He found that as regards the reaction patients may be classified as follows: 1. Those with normal sensibility to pressure in the ulnar; 2, those with none; 3, an intermediate class in which the reaction is weak, or different in the two arms. In twenty-five paralytics the results were: normal in one, weak in ten, absent in fourteen. Among seventy-five non-paralytics the reaction was preserved in twenty-five, weak in thirty-nine, absent in eleven. Further examination showed that ulnar analgesia is not related to paralysis except inasmuch as severe lesions of sensibility may be present. In non-paralytics, as a rule, analgesia of the ulnar was combined with other severe disturbances of sensibility. That ulnar analgesia is more frequent in paralysis than in other mental diseases appears to be demonstrated by the observations so far published. (*Berliner klin. Wochenschrift*, 1895, No. 42.)

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#### THE RELATION BETWEEN TABES, GENERAL PARESIS, AND SPINAL SYPHILIS.

NAGEOTTE has recently studied the pathology of several cases of general paresis, tabes, and spinal syphilis, with especial reference to the character of the lesions found.

He finds in all cases certain inflammatory changes of a chronic character, and is inclined to think that the three separate clinical pictures are only the result of the preponderance of the inflammatory process in certain locations, the nature of the process being the same in all three diseases.

He dismisses the subject with the following conclusions:

1. There exists in tabes, general paresis, and syphilitic myelitis a diffuse inflammatory process which involves the whole cord. This lesion merits the name of "vascular" or "connective" on account of the tissues it seems to attack in the first place. It consists essentially in a round-cell infiltration, which invades the pia mater, the arachnoid, and the capillaries of

the spinal cord, and which has a peculiar predilection for the coats of the superficial veins. It causes secondary alterations in the essential elements of the cord. It appears to be constant if one employs suitable elective nuclear dyes for its detection.

2. The lesions of the central cortex—causes of general paresis, those of the radicular nerves; causes of tabes, the localized foci of syphilitic myelitis are only exaggerations of this diffuse lesion in certain points of election, the determination of these points of election being due to factors still imperfectly understood.

3. The process presents a very characteristic aspect which seems to make it a distinct entity, though one cannot definitely affirm that the same causes always give rise to it. In all cases, however, it is certain that from a clinical standpoint the great majority of cases have a direct connection with syphilis.—*Archives de Neurologie*, October, 1895.

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#### PYLORIC OBSTRUCTION FROM GALL-STONES.

GALLIARD has recently reviewed this subject in an interesting manner. He comments on the rarity of the condition, and the still greater rarity of its appearance at the autopsy table.

He cites several interesting cases where faceted gall-stones had been vomited by the patient, or even passed by way of a stomach tube.

The mechanism of the obstruction would seem to be variable. In one class of cases the stone or stones ulcerate into the stomach cavity, adhesions having first formed, and then get into and occlude the pylorus.

Again, when adhesions have taken place between the pylorus and the gall-bladder, the former becomes a fixed point, and, as it can no longer recede before a gall-bladder distended with stones, the pyloric lumen can be occluded by their pressure. In another class of cases adhesions form between the gall-bladder and the stomach and by their innate power of contraction occlude the pylorus. The occlusion may at first be only partial, but, the pylorus being fixed, the gradually distending stomach drags more and more upon it and in this manner increases the occlusion.

The condition would seem to be difficult to diagnose, except in those cases where gall-stones are vomited or brought up by the stomach tube.—*La Presse Médicale*, October 5, 1895.

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#### THE LIVER AND BACTERIAL POISONS.

TEISSIER thinks that just as lymph glands may destroy or elaborate certain products brought to them, so the liver in like manner may elaborate certain poisons brought to it. This view, he states, is upheld by both clinical and experimental evidence. The author and M. Guinard have carried on a series of experiments in relation to the difference in rapidity of action of bacillary poisons when injected on the one hand into the jugular and on the other hand into the portal vein.

The animals inoculated into the portal vein died much more promptly than those inoculated into the jugular, though with similar symptoms.

The result, Teissier thinks, is due to the fact that the poison finds conditions for multiplication in the liver which are not present in the other

organs. These conditions he regards as of a fermentative nature, the fermentation leading to the production of an intensely powerful toxine.

This action of the liver, he thinks, may explain certain clinical facts, such as sudden intoxication following the passage of a choleraic stool, the poison in this case reaching the liver by way of the intestine.

The conclusions he comes to are directly opposed to those of Roger, who propounded the destructive action of the liver on poisons.—*La Presse Médicale*, August 14, 1895.

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## SURGERY.

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UNDER THE CHARGE OF

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### THE TREATMENT OF MALIGNANT TUMORS WITH ERYSIPELAS SERUM.

IN an article in the *Münchener medicinische Wochenschrift*, 1895, No. 36, CZERNY discusses this subject and relates his experience therewith. He states that accidental erysipelas sometimes has no effect on cancer, or may even hasten its course. He refers to a case of inoperable recurrent cancer of the breast, however, in a patient who insisted on the removal of the growth by operation. He concluded to remove the tumor down to the ribs. The intercostal spaces were found infiltrated with the cancer. An open wound was left as large as the hand. During the convalescence a severe attack of erysipelas brought the patient to the border of the grave. She recovered, the wound healed in eight weeks, and the cancer masses disappeared. She remained well for two years, when she died of a subacute inflammation of the lungs. At the autopsy there was no sign of cancer at the seat of the former trouble, but the lung contained cancer nodules.

He relates the case of another woman operated upon for carcinoma of the breast. The axilla was cleaned out in the most careful manner. She came to Czerny later with numerous subcutaneous nodules, hard, and of various sizes. The involved skin and fatty tissue beneath were removed. An attack of erysipelas developed, being favored by the tension of the sutures. The wound healed without trouble, and while previously there had been two recurrences at intervals of half a year, she remained well at the end of six years.

In Germany, Friedrich, of Leipzig, and Kocher have made interesting observations on Coley's method, but it appears without success.

Czerny refers to the case of a woman, who, during pregnancy, developed a



tumor of the right parotid. The tumor increased rapidly in size and broke into the external auditory canal, causing paralysis of the facial nerve and all its branches. The external ear was also involved. As extirpations were out of the question, injections of erysipelas toxin were begun. The local and general conditions improved so much that the patient wanted to go home. The microscope showed the masses growing in the auditory canal to be round-celled sarcomata with some epithelial cells and pearly bodies. The author remarks that even if this tumor entirely disappeared it would not prove anything, as it began during pregnancy, and it is well known that such growths either partly or entirely disappear after parturition in certain cases.

Another case was that of Mr. P., aged twenty-five years, with an angiosarcoma of the left lateral wall of the pharynx. It was first curetted. This was followed by the radical operation for the removal of the growth, and another operation later for the removal of enlarged glands in the neck. Injections were begun for local recurrence. They were always followed by fever, pain, local swelling, and herpes labialis. The tumor visibly decreased in size, and further glandular involvement did not occur up to the time of the report.

Typical carcinomata of the upper jaw, lower jaw, rectum, and mamma were subjected to this treatment, but without result up to the time of making the report. In one case of carcinoma of both upper jaws there was some decrease in size, softening, and improvement in swallowing. Although most of such cases are incurable, the patients should be given the chance offered by this remedy, as some tumors seem to be favorably influenced by its use.

EMMERICH and SCHOLL report six cases in the *Deutsche medicinische Wochenschrift*, 1895, No. 17, subjected to the erysipelas serum treatment:

CASE I.—A woman, aged fifty-four years. After two daily injections of 0.5 c.cm. of the serum into the pigeon-egg-sized tumor, it decreased one-half in size, and the skin that had been tense became wrinkled. On the third day the tumor had entirely disappeared after the injection of 2 c.cm. in all. Also injection into a hard subclavicular infiltration had caused considerable decrease in size. A tumor the size of a hen's egg in the axilla had disappeared in three weeks. At the end of four weeks the patient left the hospital temporarily cured.

CASE II.—A very similar recurrent carcinoma of the mamma was considerably reduced in size by injections of 0.3 to 0.5 c.cm. of the serum. The cure was interrupted, however, by other causes.

CASE III.—A sloughing carcinoma of the breast, with metastases in lungs and pleura, subjected to this treatment resulted in decreasing the size of the tumor by two-thirds.

CASE IV.—A recurrent carcinoma the size of a nut on the inner side of the arm disappeared after the use of 20 c.cm. of the serum.

CASE V.—A woman, aged thirty-four years, had a large carcinoma of the mamma and a gland in the axilla as large as a goose-egg. After sixteen days' treatment the circumference of the formerly rapidly growing tumor was reduced by eight c.cm., the gland in the axilla decreased at least one-half, and the hard, formerly carcinomatous tissues got soft.

CASE VI.—Canceroid in a woman aged sixty-five years, situated at the outer angle of the eye; 0.5 to 2.0 c.cm. of the serum were administered at a time,

with frequent interruptions, and the authors noted a decadence in the carcinomatous tissue and the partial formation of scars.

The authors also observed softening and decrease in the size of a six-year-old sarcoma of the shoulder, of stony hardness, after three weeks of the serum treatment.

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#### ANAL FISSURE OR ULCER.

HARRISON CRIPPS, in a lecture on this subject (*British Medical Journal*, 1895, No. 1803), advises that a patient with rectal or anal trouble be asked the following questions before making an examination :

1. How frequently do you go to the closet ?
2. Do you pass any discharge from the bowel, and what does it look like ?
3. Do you have any pain, and does it come on immediately after passing a motion ?
4. Does any part of the body come down at stool ?
5. Do you pass any blood ?
6. Is the pan ever sprinkled or splashed with blood as if it had come out in a fine jet ?

If the patient has frequent calls to the closet extending over some months, and if the trouble originates in the rectum, either ulcerations, cancer, or stricture will almost surely be found to be present. On the other hand, if the patient is constipated or has but one motion daily, we may be sure none of these diseases exist. The error is commonly made of supposing that constipation is a symptom of stricture of the rectum, whereas diarrhoea is nearly always complained of. If a discharge is present it is necessary to ascertain whether this comes from the interior of the bowel on going to the closet, or whether it comes from the outside as evidenced by stains on the linen. If from the inside and clear like the white of an egg, it may be mucus from internal prolapse or piles. If the quantity is considerable, a villous growth or polypus may be suspected. If the discharge is purulent or has a coffee-ground appearance, there is possibly internal ulceration, fibrous stricture, or cancer present. Discharge originating external to the bowel and staining the linen generally comes from a fistula. When part of the body comes down at stool, it will be either prolapse, internal piles, or hemorrhoids. Bleeding is common to almost all forms of rectal disorder, but one form is almost characteristic. If, during stool, the pan is sprinkled with blood, whatever else may be the matter, internal piles are almost certainly present.

Any disease situated about the anus or the last inch of the rectum gives rise to pain, whereas extensive ulceration or cancer situated above the internal sphincter may be almost painless. The pain of anal fissure is, however, almost diagnostic. It comes on during or soon after a motion of the bowels and continues for some time, gradually subsiding in the course of from a few minutes to several hours, when the patient is free from pain until the next evacuation. The pain is frequently of a burning character, and may be very severe. It is stated that in nine cases out of ten the ulcer will be found in the middle line, posteriorly.

The treatment of anal fissure may be either palliative or operative. If the case is of very recent origin, if muscular fibres are not exposed, and if there

is no undermined muco-cutaneous surface or sinus, a cure may be effected by simple remedies. The motions should be kept soft by suitable laxatives, the anus should be gently washed with soap and water night and morning, and on no account should paper be used in the closet, the part being cleansed with a sponge or cotton and water. A soothing ointment may be applied five minutes before a motion, and an astringent ointment at night. If this treatment fails, or if the case is of a more aggravated type, operative treatment becomes necessary. This Cripps describes as follows: After the usual preparation, the patient is etherized and placed in the lithotomy position. The sphincter is gently dilated and the ulcer examined with a fine probe to see if any fistulous tract exists, and the extent of the undermining of the edges. If a sinus is present it is opened in the usual manner. A speculum is next introduced in the rectum and the base of the ulcer divided. The incision should commence half an inch above the ulcer on the mucous surface and extend an equal distance on the cutaneous surface. Its depth should be sufficient to partly divide the external sphincter. A strip is then cut from either edge of the incision by scissors. The usual dressing is applied. It is recommended to keep the patient in bed two weeks; after getting about, walking will be less objectional than sitting until the wound is healed.

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#### ON SYNOVITIS AND SUPPURATIVE ARTHRITIS OCCURRING AS COMPLICATIONS OF ERYSIPELAS.

GAMGEE calls attention in the *Birmingham Medical Review*, 1895, vol. xxxviii. No. 205, to the infrequency with which these complications are referred to by most authors of English text-books. He has collected records of 817 cases of erysipelas, among which were 12 (1.46 per cent.) cases of synovitis or suppurative arthritis. Regarding the pathology of these conditions, the author could find but one reference bearing on the former, that of Schuller, who found the streptococcus of erysipelas in a case of erysipelatous hydrarthrosis. Fehleisen and Hajek hold that the streptococcus erysipelatosus is incapable of causing suppuration, which when it occurs is due, they claim, to the streptococcus pyogenes. On the other hand, a number of observers have found the erysipelas coccus in suppurating inflammation of the joints, which have been produced experimentally, indeed, in animals by injections of pure cultures. The cocci reach the joints by direct extension, when the area of erysipelas is in the vicinity of the affected joint, or by metastasis when the joint lesion occurs at a point remote from the seat of primary infection. The joint complications may arise at any time during the course of the attack of erysipelas. In two cases of synovitis recorded by Boucher, the affection appeared on the twentieth and eighteenth days respectively. In suppurative arthritis the earlier the disease appears the more acute are its symptoms, and unless prompt and energetic treatment be instituted disorganization of the joint will speedily follow, if not even the death of the patient. The prognosis will depend on the same factors as in other cases of suppurative arthritis. The treatment recommended in synovitis is perfect rest of the joint. In suppurative, free incisions and absolute fixation are advised. Amputation may become necessary.



CÆLIOTOMY FOR VOLVULUS OF THE SIGMOID IN A MAN AGED EIGHTY-FIVE YEARS; INTESTINAL DRAINAGE; RECOVERY.

J. GREIG SMITH and CHARLES E. S. FLEMMING report in the *British Medical Journal*, 1895, No. 1803, the case of a man, aged eighty-five years, who presented the usual symptoms of volvulus. There had been complete obstruction for a week. After making an incision an enormously distended sigmoid could be detected by the fingers. A fold was pinched up and brought through the wound and incised, when enormous quantities of gas escaped. The gut was found to have made one complete twist, perhaps a little more. After reducing the twist, as the abdomen remained greatly distended, it was decided to fix and drain the bowel. This was accomplished by thrusting a piece of rubber-tubing of the diameter of a crow-quill through the incision made to relieve the distention, by stretching over a probe. It was retained by passing a safety pin through the serous and muscular of the bowel and through the wall of the tube. Secondary sutures were introduced.

On the third day the abdomen was nearly flat and the tube was removed. The wound in the bowel was closed by Dupuytren's suture, and the parietal wound closed. The patient did well from this time on, excepting an attack of pain and collapse on the eighth day.

Mr. Smith says: "Intestinal drainage as an accessory is scarcely inferior to removal of the cause of the obstruction in many cases as a means of getting the patient well. Properly managed, it can scarcely do harm and adds nothing to the operative risk, while its benefits in the reduction of mortality are very conspicuous." His experience now covers one hundred cases.

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A MODIFICATION OF THE OPERATION OF PYLOROPLASTY.

ROBSON describes (*British Medical Journal*, 1895, No. 1803) two cases, and refers to a third, in which he performed the operation of pyloroplasty for stricture of the pylorus. All were successful. A longitudinal incision was made through the strictured portion, but instead of suturing this transversely, as is done in the Heineke operation, he introduced a decalcified hollow bone bobbin. Two continuous sutures were used to close the wound transversely—one through the mucous coat and one through the serous membrane. The bone-tube secures an immediate and thoroughly patent channel and affords protection to the line of sutures for from twenty-four to forty-eight hours, when union should be well established.

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RESECTION OF THE HIP FOR COXALGIA.

LAMBATTE concludes an extensive study of this subject with the following summary (*Journal de Médecine de Chirurgie et de Pharmacologie*, 1895, Tome iv. Fasc. 3):

1. Conservative treatment must be reserved for the first stage of coxalgia.
2. Surgical intervention in tuberculosis of the hip joint is indicated as soon as pus has formed in the articulation.
3. In coxalgia without suppuration surgical intervention is indicated if the pain or the deformity resists continuous extension.

4. The extension of local lesions does not form a contra-indication to operation.

5. In coxo-tuberculosis, total resection should always be practised.

6. Total disarticulation of the thigh should not be resorted to at the onset of the disease.

7. The best method of performing total resection is by the longitudinal external incision.

8. Vertical division of the trochanter should by preference form the first step of the resection.

9. In children the integrity of the cartilaginous trochanter must always be preserved.

10. The gravity of resection, practised at the beginning of the suppuration, is very slight.

11. The resection is less grave the more radical the operation.

12. In order to secure complete and definite cicatrization, it is necessary to remove all tuberculous tissue.

13. In suppurating coxalgia resection gives better results than conservative treatment.

14. The movable new joint that follows resection is superior to ankylosis.

15. Extensive resections of the acetabulum are not to be recommended from an orthopædic standpoint.

16. In children subtrochanteric resection with preservation of the cartilage of the trochanter gives results identical with simple cervical section.

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#### ON GALL-STONES.

MORRISON (*Annals of Surgery*, August, 1895) records a series of cases, including nine cases already reported, in which the operation for gall-stone was performed in accordance with the method he proposed. He endeavors to show that the secret of success in such operations is the drainage of a pouch of peritoneum, first described by him, which exists beneath the right lobe of the liver, and which is shut off by natural barriers from the general peritoneal cavity. He calls attention to other points that have interested him, and especially to the importance of a careful study of the anatomy of the right hypochondrium.

In his remarks on the nine cases now reported the author emphasizes the following conclusions:

Gall-stones are formed in the great majority of cases in the gall-bladder. Mucus seems to be essential to their formation, and this is only secreted by the gall-bladder and the larger ducts. The occurrence of stones in the small ducts does not prove their formation there; it is not difficult to believe that they have been carried there by a back flow of bile.

In addition to the ordinary symptomatology, he lays great stress upon the following facts:

When the gall-bladder is distended after the first acute attack, and jaundice and pain are absent, a stone has completely blocked the mouth of the gall-bladder or cystic duct.

Attacks of severe pain in the epigastrium and right hypochondrium, accompanied by vomiting and shivering, and followed by sweating, complete

relief and transient jaundice, are due to the passage of a gall-stone from the gall-bladder through the ducts into the duodenum.

If the relief after the attack is incomplete, the jaundice more or less persistent, and the patient attacked with ague-like paroxysms, generally with, but perhaps without pain, each attack being followed by a temporary increase of jaundice, a stone is impacted in, but does not completely block, the common duct.

Persistent jaundice and a distended gall-bladder, but without severe pain are due to a complete obstruction of the common duct, arising usually from malignant disease in the neighborhood.

Like the urinary bladder, the gall-bladder will become contracted and hypertrophied when dealing with a partial obstruction, and, like it, will dilate painlessly when all its efforts to overcome the obstruction are futile.

In regard to operation, the author concludes that the exposure of and manipulation of the pouch described causes less shock than an ordinary abdominal section, for the small intestine need neither be seen nor handled. The pouch can be efficiently drained through an opening in the parietes near the lower end of the kidney. A transverse is better than a vertical incision in operating for gall-stones. It gives better access and is less liable to be followed by ventral hernia.

The suturing of the gall-bladder to the parietes should be reserved for special cases, as experience shows it is liable to produce a biliary fistula. The gall-bladder may safely be allowed to empty into the pouch described if it is properly drained.

The pouch should be properly drained (*a*) when the gall-bladder is distended; the opening in the latter should be closed by sutures, the viscus returned into the abdominal cavity and the drain left in until the certainty of its successful closure is complete; (*b*) when the gall-bladder is shrunken and there is difficulty in closing the incision, it may be returned without suturing; (*c*) when a stone is impacted in the cystic duct, it may be excised by cutting down on it through the duct, or it may be crushed when small and soft, after which the gall-bladder must be sutured to the parietes to allow of the escape of fragments, or if the stone is hard and inaccessible the gall-bladder should be excised, the stone removed, and the cystic duct ligatured.

The author believes that considering the safety and certainty with which a stone can be removed by incision from the only portion of the duct in which it could be crushed, crushing with its risks and uncertainties should be abandoned.

If the usual operation is followed by the fresh formation of gall-stones in even a small percentage of cases, resection of the gall-bladder will have to be made the rule.

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#### AN OPERATION ON A TUMOR OF THE SPINAL CORD.

KUMMELL (*Beilage zum Centralbl. für Chir.*, 1895, No. 27) reports a very interesting successful operation for a tumor of the spinal cord. The patient was a man of good family history, forty-seven years of age, who had, since 1889, complained of weakness and pain in the limbs, which gradually increased and resisted all treatment. In May, 1893, a tumor was felt per



rectum on the sacrum; it proved to be a sarcoma, which was removed successfully, the patient recovering entirely and resuming his work.

He remained perfectly free from pain until the next year, when he began to have pain beneath the shoulder-blades. As it gradually increased the patient began to experience weakness of the legs and gradual loss of sensation, and by the 6th of November there was complete paraplegia, the patient being unable to move foot or toe. The anæsthesia reached to the seventh thoracic vertebra on the right and to the third on the left side; above this was an area of hyperæsthesia.

The history of the former tumor made it certain that here was a similar tumor of the spinal canal. The development of the disease and pain upon the left side made it evident that the tumor lay on that side and compressed the cord. The line of demarcation between the anæsthetic and hyperæsthetic zones at the third thoracic vertebra pointed to the position of the tumor there. An operation was decided upon, and the incision at this point disclosed a roughening of the third vertebra externally. After the spinous processes and arches of the third, fourth, and fifth thoracic vertebræ were removed a crumbling, profusely-bleeding tumor presented itself; the tumor was removed with a sharp spoon, and the bleeding stopped by pressure. It was then seen that the spinal cord was compressed at the point where the tumor had existed, while above and below it was normal in size. The color was dark-red and markedly cyanotic. The tumor was easily separated from the dura, to which it was not attached. The vertebræ were partially destroyed by the pressure of the tumor. It was of interest to note that the cord, during the time required for the completion of the operation, rapidly regained its normal size, losing the bluish rose-color and being distinguishable from the normal part only by the inflammatory color remaining in it. The cavity was packed with a strip of iodoform gauze that led out through the soft parts, to the surface, which were sutured. The operation occupied a little over half an hour. The patient made a good operative recovery. The pain in the wound was very slight; reflex convulsions began on the following day in both limbs. Dressings were difficult on account of the helplessness of the patient, and the wound did not heal rapidly. The fourteenth day after operation there were no symptoms of decrease in the paralytic symptoms, the only change was an increase in the convulsions of the lower extremities.

Sixteen days after the operation the patient could move the great toe of each foot, and the next day the second and third toes, though the movement was very slight. This was the only improvement for a week, when suddenly the patient could move both feet, first the right and then the left. Other muscle groups rapidly followed, until a month and one-half after operation the patient could raise the legs in bed. Sensibility improved step by step with mobility, and two months after the operation the patient could stand, and three months after he could walk with the help of a cane and the arm of an assistant. The patient continued to improve, and could at this writing walk with the aid of a cane long distances, and could go up and down stairs unassisted. The patient has, however, incontinence of urine, and is obliged to carry a receptacle and use a catheter. There also remains some difficulty in defecation. The tumor was a sarcoma about the size of a small apple.

## OPHTHALMOLOGY.

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 PARENCHYMATOUS CLOUDING OF THE CORNEA FOLLOWING  
 LIGHTNING-STROKE.

R. DENIG (Würzburg) reports (*Münchener med. Wochenschr.*, 42 Jahrg., No. 34) the case of a girl, twelve years old, knocked down and rendered unconscious by lightning-stroke, who was brought on the eighth day with rather dense parenchymatous clouding of the cornea, pericorneal injection, slight œdema of the lids, especially the upper, and severe blepharospasm. Both eyes were affected. Except the eyes there was no mark or injury. Consciousness returned in about an hour after injury. The lids were then greatly swollen, and she could not open them without assistance, and complained of clouded and impaired sight. The œdema of the lids first disappeared, and in the course of about sixteen days the corneal opacity cleared up, vision became normal, and nothing remained of the injury. The case is peculiar for the absence of changes in the lens, which are the more common effect of lightning-stroke. Denig ascribes the clouding of the cornea to physico-chemical changes produced in its substance by the electricity, similar to those supposed to cause the more common and permanent opacity of the lens.

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 CONDITION OF THE PUPIL FOLLOWING CATARACT EXTRACTION.

T. B. SCHNEIDEMAN (Philadelphia) has observed (*Ophthalmic Review*, vol. xiv. No. 165) that usually after cataract extraction the upper part of the pupil is the clearer part, and that if this clearer field were situated lower in the pupil it would often obviate the necessity of a secondary operation. He thinks this location of the clearer space is due to the fact that this part of the capsule is more thoroughly lacerated and cleansed of cortical contents by the situation of the primary capsular incision, and the mechanical action of the upward passing lens during its delivery.

To secure an area of clearness more centrally situated, he has made the first incision in the capsule horizontally, and rather below the centre, after which the cystotome was laid aside and the upper flap of the capsule slit vertically with a Graefe knife, or with the knife of Knapp. This, so far as it has been tried, has produced the desired result.

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 EPISCLERITIS PERIODICA FUGAX.

Under this name E. FUCHS (Vienna) describes (*Wiener klin. Wochenschr.*, Jahrg. viii., No. 34) a form of frequently recurrent inflammation, attacking

especially the conjunctiva and episcleral tissue. It differs from acute catarrh of the conjunctiva by the absence of secretion and its limitation to the bulbar conjunctiva, and sometimes to a single quadrant of the eyeball. From ordinary episcleritis it differs in its rapid course, the absence of nodes, and its complete disappearance during the intervals. It consists chiefly of inflammatory œdema of the episcleral tissue, but the deeper structures may partake of the hyperæmia, causing pain on accommodation or movement of the globe, myosis from spasm of the sphincter of the pupil, or transient myopia due to spasm of the ciliary muscle. The inflammation is accompanied by pain which often precedes it, and indicates the occurrence of an attack.

The duration of the attack is commonly only a few days, only in particularly severe cases is it two weeks or over. But the attacks recur at intervals varying from one week to some months, and with considerable regularity. The duration of the disease is usually some years. Fuchs, among 23 cases, finds only 7 that have entirely recovered, and one case had lasted twenty years. The attacks may become gradually more severe or less severe.

Treatment is in most cases ineffective, although diathetic treatment and hydrotherapy sometimes reduce the severity of the attacks or lengthen the intervals between them. Quinine and sodium salicylate have each proved effective in one case, bringing about a complete and permanent cure. The disease is somewhat rare, but cases have previously been accurately described by others. Fuchs has observed it most frequently in middle-aged men, more seldom in women. His patients exhibited no marked symptoms of gout, and only one had suffered from acute rheumatism. Some presented enlarged spleen and other evidences of malaria. He thinks the affection is not angio-neurotic in character, but due to abnormal nutrition, causing a gradual accumulation of noxious substances in the system, which produces the outbreak.

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#### SUBJECTIVE VISUAL SENSATIONS.

G. M. GOULD (Philadelphia) urges that these have not been studied by scientific methods to the extent their importance warrants, and he proposes (*Medical News*, vol. lxvii. No. 11) for them a more definite classification and nomenclature. He classes them as: 1. *Peripheral*, originating in the globe of the eye and optic nerve, or in adjacent related organs, including muscæ, pressure phosphenes, etc. 2. *Central*, originating in the cerebral centres where optic-nerve impulses are transformed into visual sensations, as scotoma scintillans, phosphenes from occipital traumatism, etc. 3. *Combinations* of the two, which he calls periphero-central or centro-peripheral, according as they are primarily or preponderatingly peripheral or central.

To designate the different varieties of these sensations, he proposes to call all positive light sensations *phoses*, and to divide them into *peripheraphoses* and *centraphoses*, according to their origin. Absence or interruptions of light-sensations, as scotomata, shadows, whether formless or of more or less indeterminate form, he would call *aphoses*; and divide according to origin into *peripheraphoses* and *centraphoses*. Colored light-sensations would be *chromophoses*, and could be subdivided, according to the color exhibited, as *erythrophoses* when red, *cyanophoses* when blue, etc.



## OBSTETRICS.

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 UNDER THE CHARGE OF

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 A CONTRIBUTION TO THE STUDY OF STERILITY.

IN the *Zeitschrift für Geburtshülfe und Gynäkologie*, 1895, Band xxxiii. Heft 2, KLEINWÄCHTER gives the results of his study of 648 cases of sterility and the effects of various methods of treatment. He found but 80 in which sterility could be ascribed with certainty to previous gonorrhœa. In 12 of these it was found that the husband was known to have had gonorrhœa. This gives a percentage of but 13 in which sterility in women can be ascribed to that cause. Kleinwächter believes that this estimate is too high, as his patients were of the lowest classes, in which such a cause would operate most frequently.

He found  $76\frac{23}{100}$  per cent. of his cases had married before the age of twenty-one, and ascribes to this early marriage the condition of sterility. In 14 cases malformations of sexual organs were present. In 31 cases some constitutional condition on the part of the husband was the element in producing the result.

As regards treatment, electricity was tried in these cases without result. In two of these menstruation became more regular. The cervical canal was dilated in 8 patients, and in 1 conception occurred three years afterward. In 51 patients the neck of the uterus was divided, but one of these subsequently conceived. The results of the operation of dividing the neck of the uterus in Kleinwächter's cases were so poor that he is disposed to abandon this procedure in the treatment of sterility, and also dysmenorrhœa. In several cases general tonic treatment was followed by conception without interference addressed to the uterus. He sums up his cases as 648 in number, with but 8 in which sterility seemed to have been removed by appropriate treatment. In several cases patients recovered from gonorrhœal salpingitis and subsequently became pregnant. Of the 648 patients,  $50\frac{77}{100}$  per cent. suffered from dysmenorrhœa. Kleinwächter holds that no relation exists between dysmenorrhœa and sterility.

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 LABOR IN KYPHOTIC PELVES.

KLIEN, in the *Archiv für Gynäkologie*, 1895, Band 1. Heft 1, analyzes the reported cases of this pelvic abnormality, and from the study of his own cases reaches the following conclusions: The kyphotic pelvis is met with but

rarely in labor; on the average, 1 case in 6016. Kyphosis usually develops during childhood, from an injury to the spine, followed by caries. Lumbo-sacral kyphosis is as frequent as lumbal- and lumbo-dorsal kyphosis taken together. In but 8 per cent. does the spinal column actually project over the pelvis. The entrance to the pelvis is narrowed from side to side, and this narrowing becomes greater in the outlet of the pelvis. Both inlet and outlet are narrowed in the antero-posterior diameter. The distance between the trochanters is relatively less than in normal pelves, but not in proportion to the measurement between the tuberosities of the ischia. The anatomical *conjugata vera* is increased in length. The inclination of the pelvis to the line of the horizon is notably diminished. The nates are flattened. Thirty per cent of kyphotic pelves are also contracted in all diameters. So far as pregnancy is concerned in these cases, the conformation of the pelvis does not complicate this condition. The average age of primiparæ having this complication was twenty-eight and three-quarter years. Three-quarters of all these cases terminated by spontaneous labor, one-fourth of them prematurely. The usual position and presentation were present in 97 per cent. of cases. In one-third of all head presentations the back of the child was directed posteriorly. Face presentations are more common than in normal pelves.

The prognosis for birth in these cases depends largely upon the relationship existing between the distance between the tuberosities of the ischia and the biparietal diameter of the head. The possibility of the moulding of the head and the elasticity of the pelvic joints are also factors of importance. From 58 to 60 per cent. of the cases required assistance in labor. In cases where the forceps is used the mother is exposed to two dangers—separation of the pubic joints and injuries to the vaginal walls. The head usually enters the pelvis in an oblique diameter, not uncommonly in a transverse diameter, but never in the antero-posterior. If the head enters the pelvis obliquely or transversely, it usually descends and rotates anteriorly upon the pelvic floor. Where the occiput turns behind it rarely rotates during labor to the front. The duration of labor is increased and the membranes often rupture prematurely. The mortality rate of the mothers in cases most favorable for the mechanism of labor was  $6\frac{2}{10}$  per cent., while in unfavorable cases the mortality rate was 17 per cent. Of the children 40 per cent. perished.

So far as treatment is concerned, it is of first importance that the size and contour of the pelvis be accurately ascertained. An effort should also be made to estimate the size and possibilities of moulding of the fetal head. Where cases are seen during pregnancy labor should be induced if the distance between the tuberosities of the ischia measures from  $8\frac{1}{2}$  cms. to  $6\frac{1}{2}$  cms. Labor should not be induced before the thirty-fourth week. If the patient comes to the physician at the end of pregnancy symphysiotomy may be done if the distance between the tuberosities of the ischia measures  $5\frac{7}{10}$  cms. In private cases, if a greater measurement is found, the cautious use of the forceps is indicated. Cæsarean section is indicated in those cases where the distance between the tuberosities of the ischia is less than  $5\frac{5}{10}$  cms. The author recommends podalic version in nearly all cases. Where the child is dead and the pelvis is small, craniotomy can be performed.

Klien adds an interesting postscript describing his experiment of perform-

ing post-mortem symphysiotomy upon the body of a patient who had died during pregnancy. The diameters of the pelvis were found to have been increased from 3 to 4 cms.

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#### TWO CASES OF UNUSUAL LACERATION OF THE PERINEUM.

FLESCH (*Centralblatt für Gynäkologie*, 1895, No. 45) reports the case of a young woman, aged nineteen years, who sustained at labor an injury to the perineum which consisted of a central laceration which left the posterior wall of the vagina at its lower portion intact, but tore the tissues between the bowel and the vagina, the head being born apparently through the anus. The patient was delivered under the care of a midwife. The sphincter of the bowel was entirely torn apart. The laceration was repaired, the patient making a good recovery.

His second case was one in which a resisting hymen did not permit the expulsion of the head. The hymen was torn in an annular manner, being entirely separated from the surrounding tissue. It was necessary to remove the hymen, and close raw surfaces with catgut stitches.

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#### THREE SYMPHYSIOTOMIES IN THE OBSTETRIC WARDS OF THE HOSPITAL OF RIGA, RUSSIA.

In the *St. Petersburger Medicinische Wochenschrift*, 1895, No. 43, TREYMAN reports, among other operations, three symphysiotomies. The patients were between twenty-eight and thirty years of age, and all multiparæ. They had all borne children with very difficult labors. Two of the patients were infected with the germs of erysipelas before the operation. The children were all at full term, one of them weighing nine pounds. One of the children died following a difficult forceps extraction. The mothers recovered, although one of them had fever for some time. The second of these patients, aged thirty years, died sixteen months after the operation, from dysentery. An opportunity was obtained to examine the symphysis, when it was found that perfect union had taken place.

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#### A SUCCESSFUL SYMPHYSIOTOMY.

In the *American Gynecological and Obstetrical Journal*, 1895, vol. vii. No. 5, JEWETT reports the case of a multipara whose pelvis was deformed by the jutting forward of the promontory of the sacrum. The fœtus had failed to descend after prolonged and severe labor. Symphysiotomy was readily performed, the joints being opened with a bistoury. A profuse venous hemorrhage was controlled by pressure and gauze-packing. A fistula occurred through the centre of the joint, which finally closed. The child did well for a week or more, but finally died of pemphigus. The case is of interest as being a typical one for symphysiotomy. The slight pelvic contraction and the dilated birth-canal gave the best conditions possible for the operation. The patient's exhausted state and the probability of previous infection were the unfavorable elements in the case.



## UNOXIDIZED PRODUCTS OF DIGESTION AS CAUSE OF ECLAMPSIA.

Among the many recent interesting contributions to the literature of this subject is that of MASSIN, of St. Petersburg, in the *Centralblatt für Gynäkologie*, 1895, No. 42. From experimental studies he is convinced that in the body of the pregnant patient, and especially at the end of pregnancy, there exists an abundance of but partially oxidized products, which he terms "leukomaines." These are ordinarily broken up and excreted by the liver and kidneys, but in cases where these organs are at fault these products may remain within the body of the patient. Their immediate absorption and the effect which they produce depend considerably upon the condition of the nervous system. Whatever increases the sensitiveness and irritability of the nervous system favors the absorption of this material, which is capable of producing eclamptic convulsions when in considerable amount.

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## THE HISTOLOGICAL STUDY OF THE CHANGES IN THE UTERUS DURING THE EXISTENCE OF TUBAL GESTATION.

PILLIET describes in the *Annales de Gynécologie*, October, 1895 researches which he has made in studying the changes which the uterus undergoes during tubal gestation. He finds that a true deciduous membrane forms within the womb in these cases. It is usually expelled at from six weeks to three months of pregnancy. Two conditions in these cases attract attention: the first is the characteristics of the deciduous membrane as found in the uterus, and the second the condition of the uterus after the expulsion of the decidua. So far as the first is concerned, the decidua found within the womb in cases of ectopic gestation is remarkably swollen and engorged. It resembles normal mucous membrane but little. Upon the superficial aspect of the membrane there are abundant bloodvessels which are in a condition of engorgement, while the tissues surrounding them are somewhat œdematous. In some places exudations of blood and serum may be observed. Some of these hemorrhages are the result undoubtedly of exertion and fatigue, and resemble the premature detachment of the placenta. In other places the extravasated blood is found to contain placental villi. This decidua may be expelled in considerable quantities, or it may be gradually extruded with its cellular elements in an abundant sero-sanguinolent fluid. In the latter case its recognition is more difficult. This tissue resembles very closely the network of capillaries found in granulations and in sarcomatous tissue. The muscular tissue which underlies the basement membrane was also hypertrophied, undergoes involution slowly, but shows no signs of genuine inflammation.

After the expulsion of the decidua the uterus presents many signs of parenchymatous metritis in the vascular lesions present in the dissection of muscular fibre by layers of embryonal cells. This condition may be traced to the peritoneum. When curetting is practised in these cases but little is removed, because the decidua has all escaped. New tissue gradually develops where the decidua has been removed, and the epithelium is slowly reformed. The condition of metritis may persist for a long time; without the clinical history of the case microscopic examination would render it

difficult to make a diagnosis. From these studies it is easy to observe how readily the one condition present may be overlooked, if the physician confines his attention to the condition of the uterus. Without a thorough examination of the pelvis, and without studying the clinical history of the case, the true diagnosis may readily be missed.

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#### PELVIC CONTRACTION.

In the *Medical Record*, 1895, vol. xlviii. No. 17, AUSTIN FLINT, JR., summarizes the records of 6000 cases of pregnancy in which contraction of the pelvis was noted in 654,  $10\frac{9}{10}$  per cent. Comparison of the measurements of the head, weight, and length of the child, with the measurements of the pelvis, gave no definite results. In  $86\frac{8}{100}$  per cent. (563 of the 654) delivery was spontaneous. In all of these cases the contraction was slight, the true conjugate being three and one-half to three and one-third inches. In 91 cases operative interference was necessary, and 101 operations were performed. The general results in the 654 cases of contraction of the pelvis were one maternal death from placenta praevia and shock. Of 663 children, 31 were stillborn, a total infant mortality of  $5\frac{58}{100}$  per cent.

It is important to notice from these facts, that contraction of the pelvis is nearly as frequent in America as hospital reports state it to be in Germany. As regards treatment, where there is but a slight contraction, a true conjugate of three and one-half inches or more, the treatment should be expectant. The bladder and rectum should be kept empty and the patient stimulated and supported. Where the internal conjugate is less than three and one-half inches, operative interference is usually demanded. If the true conjugate be but little less than three and one-half inches, forceps or version may be selected. In the use of forceps, a little more than 25 per cent. of infant mortality resulted. In version, a little more than 13 per cent. When greater contraction is present a radical operation is demanded.

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#### GYNECOLOGY.

UNDER THE CHARGE OF

HENRY C. COE, M.D., M.R.C.S.,  
OF NEW YORK.

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#### CONSERVATIVE OPERATIONS ON THE OVARIES.

DELANGE (*Arch. de Toc. et de Gyn.*, 1894, No. 3) reports the results of his conservative operations on the ovaries, pregnancy subsequently occurring in 30 per cent. of the cases. At the same time he does not believe that the possibility of the patient's afterward conceiving is the main object aimed at.

DONNEF (*Centralblatt für Gynäkologie*, 1895, No. 33) thinks that resection or ignipuncture is indicated in the case of every young woman who presents evidences of chronic oöphoritis associated with a healthy condition of the

uterus and tubes. When the uterus is diseased, or the patient is near the climacteric, hysterectomy is preferable.

MATHAEI (*Zeitschrift für Geb. u. Gyn.*, Bd. xxxi., Heft 2) reports six cases of ovariectomy in which partial disease of the opposite ovary was found. As the patients were young women, only the macroscopically diseased portions of the ovaries were excised, the raw surfaces being united by sutures in the usual manner. Five out of the six patients subsequently conceived and bore living children. The writer recommends this procedure in all cases of ovariectomy in which the opposite ovary contains retention-cysts too large or too numerous to be treated by ignipuncture, or even when a small dermoid cyst is present not involving the entire ovary. Exceptionally, healthy stroma may be preserved in the case of a small proliferating glandular cystoma. If the patient has passed the climacteric, or there is a suspicion of malignancy, the ovary should be entirely removed.

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#### INTRACTABLE UTERINE HEMORRHAGE.

SIVITALSKI (*Centralblatt für Gynäkologie*, 1895, No. 33) reports the case of a woman, aged twenty-nine years, who began to have profuse metrorrhagia a week after the cessation of the menstrual flow. The same phenomenon was noted after the following period, when the patient became so exsanguinated that she entered the hospital. The removal of a quantity of hypertrophied mucous membrane by curettage failed to check the bleeding, which recurred a few weeks later and could not be controlled. She was re-admitted to the hospital, and a digital examination of the uterine cavity was made with a negative result. It was finally decided to perform hysterectomy, for the patient was *in extremis*. A careful examination of the specimen threw absolutely no light upon the cause of the hemorrhage, as the only pathological change noted was a minor degree of interstitial endometritis. The adnexa were normal. The patient developed a pelvic abscess, but eventually made a good recovery.

The writer calls attention to the rare occurrence of metrorrhagia without any discoverable local or general cause, and regards it as a clear indication for total extirpation.

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#### HYDRASTININ IN UTERINE HEMORRHAGE.

KALLMARGEN (*Zeitschrift für Geb. u. Gyn.*, Bd. xxix.) reports the ultimate results of treatment with this drug in eighty-six cases of uterine hemorrhage, his observations extending over two and one-half years. The best results were obtained in simple menorrhagia, post-partum hemorrhage, and in bleeding due to hæmatocele and disease of the adnexa. In chronic endometritis it seemed to have little effect, and it is contraindicated in pregnancy and in cases of uterine fibro-myoma and inoperable carcinoma.

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#### TOTAL EXTIRPATION OF THE UTERUS, WITH SUTURE OF THE PERITONEUM.

BÜCHELER (*Zeitschrift für Geb. u. Gyn.*, Bd. xxx., Heft 2) presents the statistics of Kaltenbach's operations performed according to his method, in



which the peritoneal flaps are sutured. Out of 159 vaginal hysterectomies, 153 were performed for malignant disease, with a mortality of 3.8 per cent.; 92 patients were kept under observation from three to seven and one-half years. There were seven cases each of vesical and ureteral fistula and one of fecal fistula; the ureter was ligated once. The writer compares the mortality with the combined mortality of other German operators (9.5 per cent.), and also with the statistics of clamp-operations, and attributes the superior results to the use of the peritoneal suture, as well as to the rigid asepsis which is maintained during and after operation.

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#### CHLOROSIS AN INFECTIOUS DISEASE.

CLEMENT (*Lyon Méd.*; *Centralblatt für Gynäkologie*, 1895, No. 40) affirms his belief in the infectious origin of chlorosis, founding his opinion on the similarity between this and other infectious diseases. He observed an epidemic form in a small village, in which eight young girls under favorable hygienic conditions were successively affected, fever being the initial symptom. Enlargement of the spleen was constant, phlegmasia alba, dry pericarditis, and pleurisy being frequent complications. These could hardly be explained by a simple disturbance of the hæmatopoëtic function.

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#### RETRO-RECTAL DERMIDS.

SCHULZE (*Deutsche med. Wochenschrift*, 1895, No. 22) describes an operation for the removal of two dermoid cysts situated behind the rectum, extending from a point just above the sphincter ani as high as the pelvic diaphragm. The writer believes that these tumors originate not from the ovary, but from the spinal canal or external skin, and advises their removal through an incision in the perineum, the ischio-rectal fossa being opened by a cut extending from the posterior third of the right labium majus to a point an inch above the anus; the levator ani is separated in the direction of its fibres.

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#### INFECTION OF OVARIAN CYSTS.

MANGOLD (Inaugural Dis.; abstract in *Centralblatt für Gynäkologie*, 1895, No. 40) distinguishes two forms of infection—saprophytic and septic. The former causes suppuration of the cyst-contents, and is recognized by the hectic character of the fever, slight pain and general disturbance, the absence of evidences of peritonitis, and the presence of gas in the upper portion of the cyst. The prognosis is good. Great care should be exercised to remove the cyst intact, or, in the event of rupture, to protect the peritoneal cavity and wound. Septic infection is due to the presence in the cyst-contents of pyogenic cocci, gonococci, and the bacilli of typhoid, tuberculosis, and the colon bacilli. Chills, fever, rapid pulse, peritonitis, and profound general disturbance indicate the serious nature of the process. The prognosis is less favorable than in the former case. Bacteria may enter a cyst by direct implantation, through the venous circulation (especially from a septic puerperal uterus), through the lymphatics, by extension from an infectious peritonitis, and from the gut when the latter is adherent to the cyst. Puncture, inci-

sion and drainage, coitus during menstruation, the puerperium, infectious diseases (typhoid and malaria), gonorrhœa, salpingitis, and peritoneal tuberculosis are all etiological factors. The spontaneous suppuration of dermoids is due to the setting free of a pyogenic irritating substance from the cyst-contents.

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#### IRRITABLE BLADDER IN WOMEN.

DACHEUX (*Thèse de Paris*; abstract in *Centralblatt für Gynäkologie*, 1895, No. 40) affirms that the condition which has previously been regarded as a purely functional derangement is really, as Zuckerkandl states, due to a localized hyperæmia of the mucosa, which can be demonstrated by the endoscope. Hyperæmic patches are seen at the *bas fond*, less often at the beginning of the urethra, which bear a close relation to concomitant congestion of the uterus and adnexa, and often disappear when the latter is relieved. In obstinate cases cystotomy is advised.

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#### HEMORRHAGE AFTER VAGINAL HYSTERECTOMY.

PICHEVIN (*Gaz. méd. de Paris*, 1895, No. 11) calls attention to the danger of hemorrhage in clamp-operations. The clamp may cut through the included tissues, or the latter may slip from their grasp. This slipping is especially apt to occur when the upper portion of the broad ligament is twisted, as it must be, when it is clamped from above downward and the stump is subsequently drawn into the vagina. Cases of hemorrhage on removal of the clamps, forty-eight hours after operation, have been reported, some of which have terminated fatally. Some surgeons have been able to check the bleeding with tampons, but others have been obliged to resort to cæliotomy. The writer recommends compression of the aorta. He would use clamps only in cases of hysterectomy for pelvic suppuration, in which it is impossible to draw down the uterus.

[The inference from the writer's unfortunate experience with clamps is that he must have used imperfect instruments.—H. C. C.]

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#### ABDOMINAL HYSTERECTOMY FOR FIBROIDS.

A. MARTIN (*Berliner klin. Wochenschrift*, 1895, No. 29) reviews the history of total abdominal extirpation of the fibroid uterus, giving due credit to the pioneer work of American surgeons, and describes his own *technique*, which is briefly as follows: The vagina is thoroughly cleansed twenty-four hours before operation, and is tamponed with sublimated gauze. Immediately beforehand it is scrubbed with soap and water, alcohol, and sublimate solution. The Trendelenburg posture is not used, although the writer has no decided objection to it. After opening the abdomen the growth is lifted out *in toto*, traction being assisted by pressure exerted *per vaginam* if necessary. In some cases it may only be possible after removing some of the smaller tumors. The broad ligaments are ligated in the usual manner with juniper-catgut; one side being completely secured before the opposite ligament is ligated. A Richelôt's clamp is applied to the stumps outside of the ligatures. The uterus is then detached as low as the vaginal attachment, and the vagina

is opened posteriorly, preferably by boring into it with the end of a dressing-forceps; the edges of the vaginal wall and the peritoneum of Douglas's Pouch are then united by interrupted sutures. The bases of the broad ligaments are sutured to the lateral walls of the vagina in the same manner, the cervix meanwhile being drawn upward with a volsella. Finally, the bladder is dissected off from below, the sutures, which have been previously passed through the anterior wall of the vagina and vesico-uterine fold, are tied, and the uterus is removed. The ligatures, which are left long, are drawn down into the vagina and the peritoneal flaps are united. Drainage is not employed. The abdominal wound is then closed. The operation is often completed by the writer in thirty minutes or less, and the patients' convalescence is uneventful, so that they are usually discharged at the end of two weeks.

In 204 cases of hysterectomy the ureter was tied twice with a fatal result, but the bladder was injured in only two instances, due, the writer thinks, to the fact that he separates it from below upward before opening the anterior vaginal fornix, the procedure being materially assisted by maintaining upward traction on the uterus. Hemorrhage is entirely avoided by ligating all the vessels before they are divided.

In 43 cases, up to 1893, in which the peritoneum was not closed, the mortality was 30.3 per cent.; in 54, in which it was closed, 9.5 per cent. In 81 cases since that time, in which the above-described *technique* was adopted, the mortality was 7.4 per cent.

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#### EFFECT OF INFLUENZA ON THE FEMALE SEXUAL ORGANS.

MÜLLER (*Münchener med. Wochenschrift*, 1895, No. 41) noted the condition of the pelvic organs in 157 cases of influenza, 21 women being pregnant. Of the latter 17 aborted. Of the non-gravid women all but three showed symptoms of uterine disturbance, either hemorrhage or aggravation of previous troubles. Hemorrhagic endometritis commonly developed, as in cholera, typhus, and other infectious diseases. After the decline of the disease the uterus was frequently found to be enlarged and evidences of chronic endometritis were present, which seemed to be directly due to the influenza.

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#### EARLY RECOGNITION OF CANCER OF THE UTERUS.

KESSLER (*St. Petersburger med. Wochenschrift*, 1895, No. 37) calls attention to the fact that while cancer of the uterus if attacked in the early stage can be cured by a radical operation, the mortality of which is only 5 per cent., as a matter of fact, not over 15 per cent. of those thus treated survive, because the patients apply too late to be cured. Statistics show that in the majority of the cases well-marked symptoms have been present for a year or more before the disease was recognized, and that in 50 per cent. of these the family physician failed to make a vaginal examination, which should never be omitted in the case of any woman forty-five years of age, or upward, with atypical hemorrhages. The importance of recognizing cancer in the incipient stage cannot be too strongly impressed upon the laity.



## PÆDIATRICS.

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UNDER THE CHARGE OFLOUIS STARR, M.D.,  
OF PHILADELPHIA ;

ASSISTED BY

THOMPSON S. WESTCOTT, M.D.,  
OF PHILADELPHIA.

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THE OCCURRENCE OF SECONDARY RASHES IN SCARLET FEVER.

A. GRIFFITH (*Quarterly Medical Journal*, October, 1895, p. 23) considers this subject in a brief paper based on his experience in the Bagthorpe Fever Hospital, Nottingham. After referring to the proneness of scarlatina patients during convalescence to exhibit a scarlatiniform rash at the onset of an acute tonsillitis, rhinitis, or nephritis, the author considers the cases in which the rash is attended by all the symptoms of scarlet fever, with no other possible explanation for its occurrence. According to the author's experience all patients who have presented a scarlatiniform rash some days or weeks after admission to the wards may be arranged in three groups: 1. Those whose illness presented all the signs of moderate or severe scarlet fever, with a high temperature (103° or more), keeping up at nearly the same height for at least three evenings; and in whom there was no good evidence of a previous attack of that disease. 2. Those in whom the illness resembled scarlet fever in nature, the rash lasting from twenty-four hours to four days, with sore throat and general constitutional disturbance, the rise of temperature being not so great as in Group 1, but either high at the commencement, with a steady gradual fall, or remaining at a lower level (100° or 101°) during the continuance of the rash, and falling as the latter faded, and in whom there was clear evidence of genuineness of the first attack of scarlet fever. 3. Includes many different conditions in which a rash was observed for twelve to twenty-four hours, but is to be omitted as doubtful. Those of the first group are considered as primary attacks, while the second are here discussed as relapses. Out of about 2000 cases admitted for scarlet fever there were 14 that suffered from what was considered as second attacks of the fever. If the author's view is to be accepted, and these later rashes are to be explained as indicated (agreeing with the experience of other large isolation hospitals), the question arises whether the illness is due to auto-infection, being properly termed a "relapse" or "recrudescence," or whether it depends on the presence of other patients in the same ward, some of whom may have fever of a more virulent character. It is not difficult to imagine that in a ward containing 12 to 20 patients, even with 2000 cubic feet of air-space each, the amount of infection is very large, the virulence being possibly increased by aggregation as well as by the uniform temperature of 60° F., nor to suppose that those who have had mild attacks from a small dose of poison in the first place,

rather than from their insusceptibility, may be insufficiently protected against a larger dose of a more virulent infection. If this is the correct explanation, it would point to the inadvisability of aggregating fever cases in large wards, and still more to the fault of the usual plan of placing mild and medium, if not severe, cases in the same wards and in the hands of the same nurses.

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#### INTRA-UTERINE INFECTION WITH TYPHOID FEVER.

FREUND and LEVY (*Berliner klinische Wochenschrift*, 1895, No. 25, p. 539) record the case of a woman in the fifth month of her third pregnancy, who fell ill of typhoid fever. In the fourth week of her illness she aborted. The birth was conducted under strict antiseptic precautions with the intention of submitting the fœtus to a thorough bacteriological examination; this was begun twenty minutes after birth, the fœtus having died fifteen minutes after the cord was cut. Cultures were taken from the placenta, the pulp of the spleen, and the blood from the heart, and in all three the bacillus of Eberth was found. The differential diagnosis as regards the colon bacillus was made by the morphological and biological characteristics of the cultures and by inoculation tests. Cultures from the superficial parts of the placenta and from the vernix caseosa remained sterile, thus excluding the possibility of accidental infection. The anatomical lesions of the fœtus were confined to a slight hypertrophy of the spleen, which appeared a little softer than in the normal state. The patches of Peyer were not ulcerated and the intestinal mucous membrane was normal. The absence of specific lesions, which is common to all cases of intra-uterine infections, is attributed by the author to two facts: to the septicæmic form which all such intra-uterine infections exhibit, and to the absence of functional work in the special organ which in the adult the micro-organism chiefly attacks.

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#### ICTERUS NEONATORUM.

SCHREIBER (*Berliner klinische Wochenschrift*, 1895, No. 25, p. 548) believes that of all the theories advanced to explain this phenomenon, that of Quincke is the only one that sufficiently explains all the facts. This theory attributes icterus of the newborn principally to the persistence of the venous canal of Arantius; by this avenue the biliary pigment absorbed from the intestine would pass directly into the general circulation and would not be retained, as in the adult, in the liver. Beside this principal factor Quincke cited several subordinate ones, namely, the abundant production of bile through the destruction of red blood-cells, the inadequateness of urinary excretion in the newborn, the richness of the meconium in biliary pigment, and the non-transformation, in the intestine, of bilirubin and urobilin, due to the absence of intestinal putrefaction in the newborn.

These propositions Schreiber verifies from his own observation. Quincke cited 5 cases of persistence of the canal; the author has observed it in 7 cases, and calls attention to the results of Elsässer, who, in 200 infants dying within the first eight days, found the canal closed in but 23, and in only 3 out of 78 which had perished very shortly after birth. Injection experiments demonstrated that the blood passes through the canal; and by other experi-

ments he was able to show that blood from the intestine passes by the hemorrhoidal veins into the vena cava without passing through the liver.

Concerning the absorption of bile pigment from the meconium, the author has shown by experiments upon dogs that, when bile was injected into the rectum, in all cases the bile-pigment appeared in the urine and the hemorrhoidal veins showed evidence of staining.

The conditions of urinary excretion are also important, for it is evident that when little urine is passed in the early days of life the system is imperfectly relieved of the bile pigments.

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#### A CASE OF TRISMUS AND TETANUS NEONATORUM.

BAGINSKY (*Berliner klinische Wochenschrift*, 1895, No. 7) records a case under this title in a strong, well-nourished female infant nine days old, who had been ill for twenty-four hours. The case was submitted to antitoxin treatment according to the method of Behring and Kitasato, six injections being given over a period of four days. Death occurred upon the fifth day of the disease. Cultures of serum from the navel made on the second day of the disease showed the tetanus bacillus, and produced in a mouse typical tetanus and rapid death.

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#### A CASE OF BLENNORRHAGIC ARTHRITIS IN A NEWBORN INFANT.

HAUSHALTER (*Congrès de Médecine interne de Bordeaux, Revue mens. des Mal. de l'Enfance*, October, 1895) adds a new case to the few already reported in which arthritis was associated with a purulent ophthalmia in a newborn child. The right knee and left wrist were the joints involved; the knee was more severely affected and was the seat of an abundant affection which contained polynuclear leucocytes, and showed the presence of the gonococcus.

According to the author this is the eleventh case of the kind reported. [Vignaudon (*Revue mens. des Mal. de l'Enfance*, May, 1895), in a paper written before January, 1894, gives the notes of twelve cases following ophthalmia collected from the literature, and eleven cases following vulvo-vaginitis, including two observations of his own.] A study of the cases shows that there is no connection between the development of the arthropathy and the abundance of the ocular suppuration. In the great majority of cases gonorrhœal rheumatism in the newborn is mono-articular or oligo-articular; the knee is almost constantly involved, much more frequently than with older children or with the adult. The general condition is little affected and fever is habitually absent. The duration is scarcely more than a month, and cure results without deformity.

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#### THE APPEARANCE OF BACTERIA IN THE INTESTINE OF THE NEWBORN BEFORE FEEDING IS BEGUN.

SCHILD (*Zeitschrift f. Hygiene und Infektionskrankh.*, 1895, Bd. xix. S. 113) presents an interesting study of the bacteriology of the meconium of fifty newborn infants. Specimens were taken aseptically from the rectum at various intervals after birth, but before any form of nourishment was administered.



Under these conditions it was found that the meconium, sterile at birth, became infected at the end of four hours in the earliest instances, and not later than twenty hours in any of the cases, the average time being between the tenth and seventeenth hours of life. The following microbes were encountered: the porcelan-coccus of Escherich, the liquefying fluorescent bacillus, the non-liquefying fluorescent bacillus, the bacillus subtilis, the colon bacillus, the proteus, and a bacillus which the author was unable to classify. It is interesting to note that the bacillus coli communis was found very infrequently, and the bacterium lactis aërogenes was never found, thus confirming Escherich's earlier studies of the meconium.

Under the conditions of the observations the mode of infection was directly by way of the anus and rectum. The author shows that micro-organisms accidentally introduced into the mouth and swallowed with the saliva take more than twenty-four hours to reach the meconium, and then require several hours to multiply in this culture medium. On the other hand, the microbic flora of the peri-anal region appeared several hours before the infection of the meconium and embraced the varieties later observed in the rectum. This observation is conclusively proven by the fact that in three cases after disinfection and antiseptic dressing of the peri-anal region the meconium remained sterile for twenty hours. As sources of this infection the author mentions the water of the bath, in which, beside innumerable other microbes, the seven varieties above named were found; the air of the lying-in chamber, in which four of the seven varieties were recognized. The linen and vaginal secretions of the mother do not seem to play any part in this connection except in very rare instances.

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#### DYSENTERIC LESIONS FOLLOWING MEASLES.

MESLAY and JOLLY (*Revue mensuelle des Maladies de l'Enfance*, August, 1895, p. 370) report the cases of four children suffering from measles admitted within a short period to the Hôpital Trousseau; the disease in each case was complicated with a diarrhœa characterized by mucous and bloody stools; all four children died with broncho-pneumonia. At the autopsy, apart from the pulmonary lesions which seemed to have been the immediate cause of death, there was found ulceration of the sigmoid flexure and rectum absolutely analogous to those of a true dysentery, but with small follicular ulcers extending even to the small intestine, and in the most aggravated case far up in the small gut. Rilliet and Barthez have described a form of dysenteric diarrhœa as occurring under their observation twice after measles and four times after variola, but in none of these cases did the ulceration of the intestinal mucosa compare with that in one of the cases here recorded, which is approached only by a case of ulcerous colitis reported by Worthington (*British Medical Journal*, November 30, 1889).

It may be added that such an intestinal complication adds greatly to the gravity of the prognosis of a broncho-pneumonia occurring under these conditions.

## HYGIENE AND PUBLIC HEALTH.

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 UNDER THE CHARGE OF
EDWARD F. WILLOUGHBY, M.D.,  
OF LONDON;

AND

CHARLES HARRINGTON, M.D.,  
INSTRUCTOR IN MATERIA MEDICA AND HYGIENE, HARVARD MEDICAL SCHOOL.

---

 CHOLERA BACILLI AND UNCOOKED MILK.

DR. FRITZ BASENAU's experiments (*Archiv der Hygiene*, xxiii, p. 170) on the life of cholera bacilli in milk appear to disprove the conclusions of Hesse, who found that uncooked milk has the property of killing the cholera germ within twelve hours. Basenau finds that not only it does not possess this power, but that the germs are active after thirty-eight hours, and that up to the point of coagulation they considerably increase in number. In polluted milk they were found to be active for at least thirty-two hours at different temperatures (24°, 37°, and at the room temperature), and to remain so even after the milk is coagulated. With these results in mind, the recommendation of Hesse to use milk as a prophylactic and curative agent in time of cholera must not be too readily accepted.

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 POISONOUS ACTION OF THE AQUEOUS VAPOR OF EXPIRED AIR.

DR. LIVIERATO (*Arch. Ital. di Biol.*, 1895, p. 279) condensed the aqueous vapor of the breath of persons afflicted with disease of the respiratory tract accompanied by fever, of the same without fever, of persons with fever but with no respiratory disease, and of persons in health, and injected the liquids obtained into rabbits. That from the first mentioned caused a fever lasting from three to six days, dulness, and diminished reflexes; that from the patients with no fever gave the same results, but less marked; that from persons with fever but no respiratory disease produced little or no effect, and that from persons in health none whatever. The results were the same in each case when the liquid used was sterilized.

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 TYPHOID FEVER, POLLUTED WATER, AND FLIES.

SURGEON-MAJOR BATTERSBY, A.M., S. Chitral Relief Force (*British Medical Journal*, August 10, 1895) suggests the probability of the existence of some other cause for typhoid fever than impure drinking water, inasmuch as "here in India we witness year by year outbreaks of enteric which are most difficult, if not impossible, to trace to a water-borne cause." He then draws attention to the part taken by the common house-fly as a carrier and disseminator of the disease, and speaks of the universal prevalence of enteric fever among Europeans in India; and *apropos* of water as a cause says: "Our water supply has in many instances been above suspicion, being procured from springs coming directly from the mountain-side, and yielding no reaction as to oxi-

dizable organic matter when tested with permanganate of potash solution." The theory of Dr. Battersby as to the part taken by the house-fly as a disseminator of the disease is opposed by Dr. Gilbert Kirker, Staff Surgeon R. N. (*British Medical Journal*, August 24, 1895), who writes: "The contrast between the statement of theory and the statement of the actual occurrence is very striking, and I take advantage of it to direct attention to a different aspect of the causation of the enteric and other fevers from which British sailors and soldiers suffer in hot climates. Surgeon-Major Battersby, finding that the theory of water causation did not fit the facts, has recourse to flies as the carriers of the poison and disseminators of the disease. To my mind, however, the fly-borne, as well as the water-borne, theory leaves unexplained the constantly observed but much neglected fact that while strangers are suffering the natives are in good health. The native Egyptian, whom I know, abhorring filters, drinks the highly contaminated Nile water and lives in a swarm of flies, yet he is also not attacked by typhoid fever, while the carefully fostered British soldier is." Dr. Kirken attributes the trouble to the "ignorance of the art of living in hot climates."

These two communications bring most forcibly to mind the experiments and conclusions of Flügge, Arnould, Kraus, Karlinski, and others, that the typhoid bacillus and certain other pathogenic micro-organisms have a better chance of life in sterilized or organically pure water than in grossly polluted water, in which they appear to be soon overcome by the other non-pathogenic bacteria.

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#### AMERICAN VERSUS GERMAN BEEF.

BOYSEN and VOLLERS (*Mittheilungen für Thierärzte*, i, No. 8) record themselves against the widespread suspicion and dread of American beef imported into Germany as being tuberculous. Examination at Hamburg of over 8000 imported American beeves showed that only four, or 0.05 per centum, were tuberculous, while of native beeves for slaughter at the same place 8 per centum were found to be afflicted.

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#### POWDERED MEAT.

The *Pharmaceutische Centralhalle* (1894, xxxv, p. 453) furnishes a recipe for a condensed meat which might be very valuable for military or other expeditions. Lean meat is cut into small strips, dipped into hot fat for a few minutes, then drained, and slowly dried in the oven. The dried meat is finally ground in a coffee mill. It has a pleasant taste and smell, keeps well, is not bulky, is easily digested, and can be used in many different ways.

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#### UNDESIRABLE IMMIGRANTS A MENACE TO THE FUTURE AMERICAN PHYSIQUE.

DR. J. W. ACHORN (*The Dietetic and Hygienic Gazette*, June, 1895, "A Suggestion for the Preservation of the American Physique") communicates some interesting facts as to the physical condition of some of the immigrants admitted to this country from abroad, practically without examination, facts which should claim serious consideration by our national lawmakers. Dr. Achorn says that a steamer on which he returned to this country from



Europe brought 600 Italians, Hungarians, Polish and Hungarian Jews, Russians, Bohemians, Arabs, and other steerage passengers, among whom were seven lame and eighteen deformed. He examined 153 of the total 600, and found four cases of advanced phthisis, six of inherited syphilis, two of fetid abscess, three of syphilis, one of delirium tremens, nine of rickets, "any number of skin diseases, parasitical and otherwise," two of favus of the scalp, and three of chronic ulcer of the leg. Only one of the 600, a man with cataract of the left eye due to syphilis, was refused admission to the country.

#### BUBO PLAGUE IN CHINA.

The plague broke out in Macau, a Portuguese colony thirty miles from Hong Kong, in May, 1894, but only six cases occurred. In February, 1895, it broke out again and soon became epidemic. In the absence of official statistics there is no way to learn the probable mortality, but it is known that during the second week in May as many as seventy or eighty deaths occurred daily. On June 12th the death-rate was fifteen daily. Only 10,000 of the 80,000 inhabitants remained in the town. The chief sufferers were the Chinese, though the Portuguese suffered severely. In Hong Kong, where plague raged in 1894, only six or eight English were attacked, showing, as was then stated, that the European is practically immune. The Portuguese of Macau, however, are not European Portuguese, but are descended from the parent stock which came to Macau 350 years ago and freely intermarried with the Chinese. At Macau the disease was exactly like that of 1894 at Hong Kong; the mortality was as severe and the bacillus identical.

It is surmised that the infection came originally from Canton, about one hundred miles away. Plague travels slowly and remains a long time in any community attacked. It appeared at Macau seven months after the disappearance of the disease at Canton. Assuming that it had started from Canton during the height of the epidemic there, say in May, 1894, it took nine or ten months to travel one hundred miles. That it is a soil-bred and a soil-supported disease there seems to be little doubt, and the belief that animals, especially rats, are the carriers daily receives confirmation. [From an editorial in the *British Medical Journal* of July 20, 1895.]

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less the attack is a very severe one, the above treatment is sufficient.

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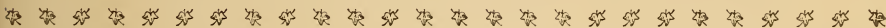
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STONES IN THE COMMON DUCT AND THEIR SURGICAL  
TREATMENT,

WITH REMARKS ON THE BALL-VALVE ACTION OF FLOATING CHOLEDOCHUS-  
STONES.<sup>1</sup>

BY CHRISTIAN FENGER, M.D.,  
OF CHICAGO.

GALL-STONES in the common duct were found by Fiedler in only 2 out of 800 autopsies (Courvoisier). Schloth in 343 cases of cholelithiasis found stones in the common duct 9 times, that is, in 2.6 per cent. of the cases. Courvoisier found stones in the common duct in 10 out of 255 cases of cholelithiasis, or in 3.9 per cent. of the cases. Conradi found gall-stones in 2.6 per cent. of dead bodies; namely, 1.6 per cent. in men and 3.6 per cent. in women. In 97 cases of cholelithiasis he found stone in the gall-bladder alone in 82 cases, in the gall-bladder and common duct in 10 cases, and in the common duct alone in 5 cases; that is, he found stones in the common duct in nearly 15 per cent. of the cases of cholelithiasis.

As gall-stones, when located in the common duct, almost always give rise to serious disturbances, obstruction to the flow of bile and its consequences, while, when located in the gall-bladder or cystic duct, they cause little or no disturbance as long as no infection or inflammation occurs, it is obvious that although the cases of choledochus-stone are in the minority, varying from 2.6 per cent. to 15 per cent., this minority

<sup>1</sup> Read before the American Medical Association, 1895.

will make itself felt partly from the gravity of the symptoms caused, and partly from the dignity of the operation demanded for relief.

Operation for stone in the common duct is of comparatively recent origin. A number of different operative procedures have been employed, and are yet under discussion. The symptoms of stone in the common duct, in contradistinction to those of stone in the gall-bladder and cystic duct, have not hitherto been sufficiently differentiated. The surgical anatomy and pathology of the common duct and its surroundings have received little attention, as this region of the body has become a field of operation only within the last five years. I have had the opportunity of observing six cases of stone in the common duct during the past year, in five of which I operated, and in two obtained an autopsy. The material thus obtained I have used as a basis for the study of stones in the common duct, with especial reference to some points in the anatomy, symptoms, and operative treatment, which have either not been mentioned at all, or have received only slight attention in the brilliant and exhaustive monograph of Courvoisier. To this author we owe not only this monument in the pathology and surgery of the bile-ducts, but also choledochotomy, or, as he calls it, choledocholithotomy, the operation of choice for stones in the common duct.

I will first report the six cases in detail. When attempting to think over the plan of operation to be performed in a difficult or uncertain case, I have often derived great help from reading the reports in detail of similar cases. The greater the detail, the more valuable were they to me. The too common method of presenting a merely cursory report of a large number of cases is entirely valueless in this regard. For this reason I present in detail the reports of the following cases. The first case, in which no operation was performed, but in which an autopsy was made, furnished the material for the study of the pathological anatomy and the mechanism of ball-valve action in choledochus-stone. In order to avoid repetition, the most essential points in relation to these two subjects have been embodied in the report of the autopsy in this case and in the remarks thereon. The remainder of the cases furnished the material for symptomatology and treatment.

*CASE I. Synopsis: Two years ago first attack of colic with icterus. Attacks more and more frequent with slight remittent icterus. Remittent pain every two or three days for three weeks, followed by fever, icterus gravis, and death. Autopsy revealed one small floating stone in the dilated common duct.*

Mrs. G. E., aged thirty-one years, was admitted to the German Hospital in the service of Dr. Hessert, March 29, 1895. The mother of the patient died at the age of forty-two years from a trouble similar to that for which the patient entered the hospital. Nothing further of the family history of the patient could be ascertained.

As a child the patient was weakly; at the age of twelve years she



began to menstruate; menstruation has always been regular and without pain. At about the age of eighteen years she began to have vomiting attacks at intervals of five or six weeks or less, especially after eating indigestible food. The vomitus consisted first of food and later on of brownish slime. The emetic efforts were exceedingly violent, as though "she could vomit up the abdominal viscera."

The patient always appeared healthy except after one of these attacks of vomiting, when she would lose in weight, but would afterward regain health and flesh rapidly. The attacks lasted one or two days, during which time she would vomit for perhaps five minutes at intervals of an hour. The vomitus was usually a brownish fluid. Each year there has been a slight increase of the symptoms, and the vomiting has been more severe and frequent.

In 1883 the patient married. She has had seven children. Three or four days before her last confinement she had a very severe attack of vomiting, with intense pain in the lower part of the back and abdomen. Shortly after her confinement she had another attack of vomiting accompanied by intense pain in the epigastric region. A few hours after this attack began, the skin and the sclerotics were noticed for the first time to be icteric. This attack lasted for fourteen days, during which time the patient rapidly lost weight, losing altogether about sixty pounds. The attacks of vomiting finally recurred every two weeks. The pain in the abdomen, epigastric region, and back became constant, but the pain over the region of the gall-bladder occurred only every two or three days. On the day following each attack the skin was of a darker, icteric hue.

In February, 1895, the patient undertook the water-cure, which resulted in slight temporary improvement of her condition. About March 1st she was suddenly seized with severe pain in the "inguinal region" and lower lumbar region, accompanied by vomiting. The patient felt during this attack as if something had given way, whereupon the severe inguinal pain immediately ceased, but the pain in the back continued for several hours. Two days later she had another attack of pain which lasted for three weeks, with exacerbations of pain every two or three days in both hypochondriac regions. After the 17th of March the patient felt better, but every afternoon about 4 o'clock she was seized with a chill and fever. Upon March 24th, severe general headache began, which became constantly worse, until she lay in a stupor. Her condition became more grave, the stupor more profound, and she died on April 5th. For three days before she died there was no vomiting. The stools were very dark, greenish-brown, and without foul smell, but had a very peculiar mouldy odor. The patient had exceedingly severe and almost constant pain located over the left lobe and median line of the liver. The bowels moved twice during the three days before she died, and the urine was drawn off by catheter.

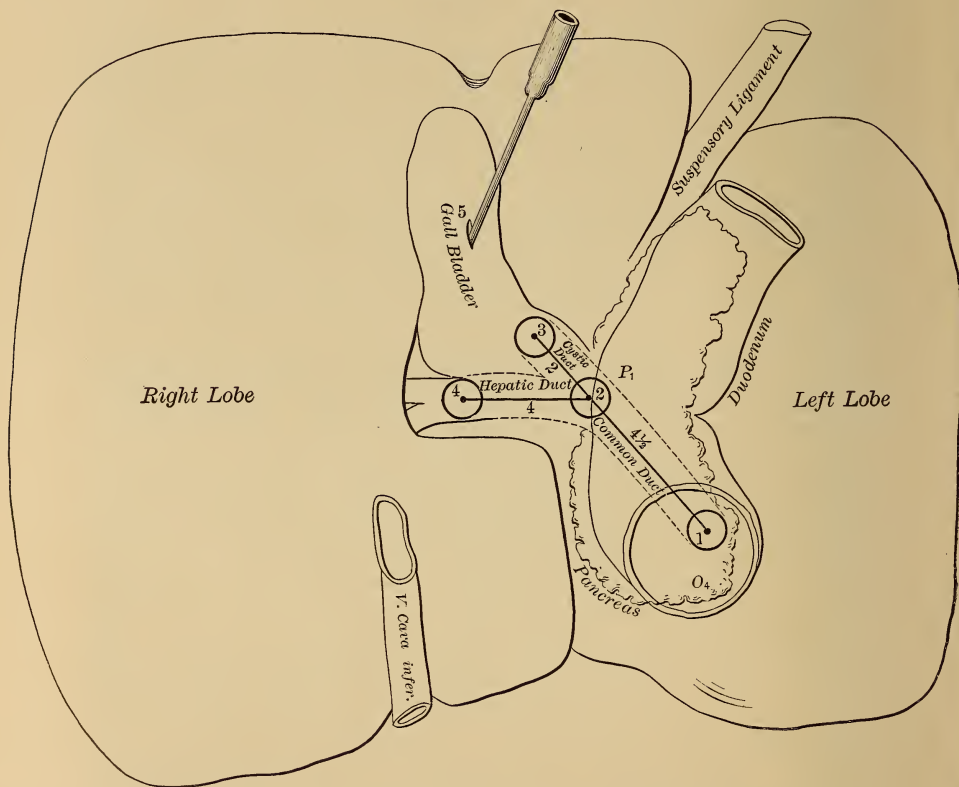
*Autopsy* by Dr. Haiselden. The subject was emaciated, the skin dark and presented a somewhat bronzed appearance. The thoracic viscera were normal, with the exception of old adhesions in the apex of the right lung. The abdominal viscera were normal with the exception of the kidneys, which contained small hemorrhagic infarcts, and the left ovary, which was small and atrophic, and contained a cyst the size of a butternut, filled with clear serous fluid. The brain on section showed a large quantity of fluid in the ventricles. The liver, gall-bladder, pan-

creas, and duodenum which was ligated above and below the pancreas, were removed entire.

The liver was flabby and a dirty brown in color. Upon cross-section the surface was a dirty brownish-yellow; the tissue was soft and friable, so that the finger could be easily pushed into it (acute yellow atrophy).

The gall-bladder was empty, atrophied, and small, so that it did not extend to the incisura hepatis. When a glass tube was inserted into the gall-bladder and the latter inflated with air, the air filled first the gall-bladder, then passed down into the cystic duct, then into the common duct, and then entered and distended the duodenum. No stones could be felt in the gall-bladder or in the cystic duct.

FIG. 1.



In the common duct a small round stone, 1 centimetre in diameter was felt; it was movable—that is, it could be pushed or dislodged with the finger from the duodenal end of the common duct into the hepatic duct. It could be pushed up into the hilus at “4” (Fig. 1); was more superficially located at “2” at the border of the duodenum; from this point it passed downward behind the duodenum to “1.” The horizontal portion of the canal was 4 to 4½ centimetres long, and the oblique portion 4½ to 5 centimetres long. The lower portion of the duct was

surrounded by pancreas-tissue, and the stone was stopped at the lower end of the head of the pancreas on the middle of the posterior surface of the duodenum.

**REMARKS.** The cause of death was cholæmia or icterus gravis. The opening from the common duct into the duodenum was not completely closed, as air could be inflated, and as the duodenum contained greenish fluid feces. The cystic duct was open to air-inflation, and the gall-bladder contained a dirty green fluid, together with yellowish-green gravel.

The stone acted as a "ball-valve," and caused icterus, when it lay close to the opening of the common duct into the duodenum, by stopping the passage of bile into the duodenum. The stone was freely movable in the common and hepatic ducts. The stone was not grasped tightly by the common duct, as Courvoisier states. The wall of the common and hepatic ducts was not thickened, but the ducts were considerably dilated. There was neither pus nor inflammation in or around the duct, nor cholangitis. The stone was probably the cause of the emptiness and atrophy of the gall-bladder and of the cystic duct.

That the small gall-stone, 1 centimetre in diameter, freely movable, floating or swimming in the ductus choledochus, cystic and hepatic ducts might have caused complete stoppage of the flow of bile by acting like the ball in a ball-valve was proved by the following experiment:

The duodenum was opened opposite the diverticulum of Vater, and the papilla, on which the opening from the duodenum into the diverticulum was found, was seen to be of normal size and shape, and the duodenal mucosa and wall in normal condition. A silver probe passed readily from the duodenum into the common duct, and when it was pushed down toward the end of the common duct grated against the stone. A silver probe passed down from the gall-bladder into the common duct passed easily through the latter into the duodenum. It is comparatively easy to pass a probe through a dilated common duct, but it is not until search has been made by pushing and sliding the mucous membrane of the duodenum that the exit of the duct is found; because the dilated duct, just above the canal through the wall of the duodenum, forms a pouch or pocket in which the probe is caught until the narrow exit is found. There was no stenosis of the duodenal opening of the common duct, but the common, cystic, and hepatic ducts were all dilated.

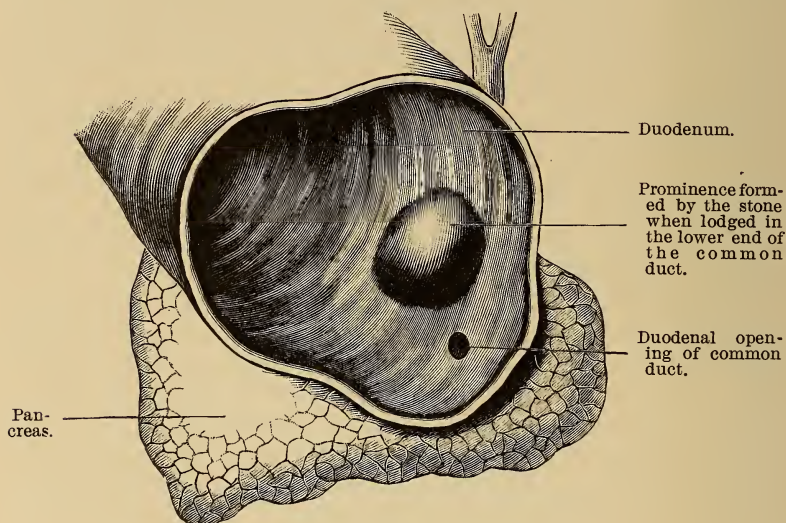
A canula was now inserted in the gall-bladder (see Fig. 1), through which glycerin, which has about the same consistency as bile, was injected until first the gall-bladder, then the cystic, then the common, and finally the hepatic duct were filled and distended.

When the stone was now placed in any of the ducts or in any place with the exception of the lower end of the common duct, the glycerin would flow out in a continuous stream through the opening into the duodenum.



When the stone was made to slide down as far as it would pass into the common duct, namely, into the cul-de-sac or pouch just above the duodenal opening (Fig. 2), the flow of glycerin into the duodenum ceased, and a further injection through the canula into the gall-bladder made the duct and the gall-bladder more tense and full, but not a drop of the glycerin entered the duodenum.

FIG. 2.



When I now dislodged the stone a little, pushing it up out of the pouch by pressing slightly on the prominence which it formed in the duodenum,  $\frac{1}{2}$  cm. above the opening, the glycerin immediately began to flow into the duodenum. This flow would continue until I again pushed the stone back into its former position. I repeated this experiment a number of times, and always with the same result, namely, that the flow of glycerin would cease entirely as soon as the stone came down into the cul-de-sac immediately behind the opening of the duct into the duodenum. I therefore considered that the "ball-valve" mechanism as effected by the small round stone in the pouch at the lower end of the common duct, behind the normal duodenal end, was the sole cause of the stoppage of the flow of bile, of the retention of bile, and of the icterus.

Exact measurements of the distances which the stone could be moved in the respective ducts gave the following results, as shown in Fig. 1:

(a) *Common Duct.* From the cul-de-sac, the lowest point to which the stone could be forced, up to the junction of the hepatic and cystic ducts, was 4.5 cm.

(b) *Cystic Duct.* The lower part of cystic duct was 2 cm. long; that

is, the stone could be pushed up into the duct to this distance. Its direction was in a line with the common duct, an oblique line directed from above anteriorly, and the right, downward, backward, and to the left, forming an angle of  $45^\circ$  with the horizontal and vertical lines, respectively.

(c) *Hepatic Duct.* The stone could be moved in the hepatic duct a distance of 4 cm. in an almost horizontal direction from left to right (see Fig. 1). When the stone was lodged in the right end of the duct, or was pushed or made to slide as far to the right as possible, it disappeared from the surface down into the liver, so that only its upper or anterior surface could be felt, and even this was attended with considerable difficulty. The point at which it descended into the liver was 1 cm. to the left of the medial or left border of the right lobe (in the horizontal branch of the "H" in the hilus, 1 cm. from its right end). The hepatic duct, having a horizontal direction, thus formed an angle of about  $45^\circ$  with the cystic duct, and an angle of about  $135^\circ$  with the common duct.

The passage of bile back into the cystic duct and the gall-bladder was free when the entire system of gall-bladder and ducts was filled with glycerin, and when the stone was free in the middle of the common duct.

The ball-valve action of the stone in the cystic duct, whereby the filling of the gall-bladder with bile was prevented, was demonstrated in the following manner:—

The gall-bladder was opened at "5," Fig. 1. The stone was made to slide up into the cystic duct until it lodged at "3." Glycerin mixed with white lead, so as to look milky white, was injected through a canula inserted from the duodenum, through the duodenal opening, into the common duct for a distance of 1 to  $1\frac{1}{2}$  inches. The common and hepatic ducts filled slowly until the place of lodgment of the stone in the cystic duct was reached, but here the fluid was stopped and did not pass up into the gall-bladder. When the stone was made to slide down into the common duct, the fluid flowed up into and out of the gall-bladder at "5." This experiment was repeated several times with identical results; the stone acted as does the ball in the ball-valve, and prevented the passage of the fluid into the gall-bladder.

During this experiment, while the common duct was distended with the fluid, the hepatic duct also became distended, and the glycerin-emulsion escaped from the cut surface of the right lobe, from the right border of which pieces had been removed for microscopic examination. This escape of the fluid from the distal branches of the bile-ducts of the liver proved that the larger hepatic ducts and the smaller bile-duct were permeable. The prevention of regurgitation of bile from the common duct into the gall-bladder by ball-valve action of the stone in

or near the cystic duct explains why the gall-bladder is found small and empty in cases of movable stone in the common duct. When the stone has been lodged in the cystic duct at "3," and the gall-bladder has been empty for a considerable time, possibly for months, the latter naturally retracts and loses its power of distention, its elasticity, so that it cannot be filled to its normal capacity, even if the passage becomes free later on by occasional dislodgment of the stone.

It is impossible to demonstrate the ball-valve action of a choledochus-stone on animals or even in normal biliary passages. The proof of this action requires a system of biliary passages altered by the presence of a choledochus-stone in the manner here described. The experiment undertaken with this specimen proved conclusively, and to the satisfaction and conviction of those present, the ball-valve action described above.

The bearing of the effect of this ball-valve action on the symptoms and course of cases of choledochus-stone is obvious. Its action is dual:—

(a) It causes intermittent attacks of retention of bile and icterus when the stone is lodged immediately above the duodenal opening of the common duct.

(b) It causes atrophy and shrinkage of the gall-bladder when the stone is lodged in or immediately below the cystic duct.

The ease with which a comparatively small stone is dislodged and floats around in the dilated canal; namely, the common, cystic, and hepatic ducts, is remarkable; it requires only a very slight touch with the finger or sound outside of the duct to push the stone from one place to another. As the stone has about the same specific gravity as the bile, it moves upon the slightest contraction of the wall, or when currents of bile act upon its surface. Thus, movements of the body which cause movements of the liver, duodenum, or transverse colon may cause movements of the stone from one place to another.

The specific gravity of the human bile is 1.030. Although the choledochus-stones, as, for instance, in three of my cases, float in the bile, they sink in water. The specific gravity of gall-stones thus lies between 1.000 and 1.030.

The direction of the large bile-ducts is almost horizontal when the body is erect. If the specific gravity of the stone plays any part in causing its dislodgment, it might be possible to dislodge it from its position behind the duodenal opening of the common duct, where it causes biliary colic and icterus. I therefore think it might be well to place the patient suffering from this condition, for a time but not constantly, on the right side, or on the stomach.

Ball-valve action was observed by Courvoisier in the cystic duct in two cases of his own, and in one case of Socin's during operation for gall-stone, but neither Courvoisier nor any other author has, to my knowledge, observed this phenomenon in the common duct.



Courvoisier describes his observation as follows (*loc. cit.*, page 18): "A peculiarly strange condition is the following: The more or less round, spherical stone is situated in a dilated portion of the cystic duct in such a manner that it is not immovably grasped by the wall of the duct, but so that it can be moved or moves only a short distance in a proximal and distal direction. If we now make pressure on the fundus of the gall-bladder, its contents will press the stone firmly down into the duct, causing it to close the duct hermetically like a ball-valve, so that not a drop can pass out. The bile, however, from the hepatic duct (Why not from the common duct?—F.) can yet enter the gall-bladder as long as no great tension exists here. This peculiar condition, which plays a part in the genesis of certain ectasias of the gall-bladder, I have myself observed in two cases during cholecystectomy and also in an analogous case of Socin's."

Neither Courvoisier nor any other author seems to have observed the ball-valve action of floating stones in the common duct. While this condition in the cystic duct is comparatively rare, and is of little practical importance, as it could cause dilatation of the gall-bladder only, I have reason to believe that the floating stone with ball-valve action is the condition ordinarily found in the common duct, and is of great practical importance, as it explains the causation of the remittent icterus and of the multiple slight attacks of icterus and colic. It has also a scientific importance, as it explains the atrophy of the gall-bladder, which takes place in the way I have described above.

*CASE II. First attack of biliary colic two years ago followed by icterus; second attack, October, 1894, followed by frequent lighter attacks; loss of weight, 15 pounds in ten weeks; slight icterus; no tumor of gall-bladder; operation; adhesions to atrophic gall-bladder; choledochotomy; one stone, 2 cm. in diameter, removed; no leakage of bile; recovery; gained 50 pounds in three months.*

Mrs. C. L., married, aged forty-two years, was admitted to the German Hospital, January 3, 1895. Family history good; patient began to menstruate when sixteen years of age; has always been regular; flow has been excessive and each period accompanied by backache and nausea; no leucorrhœa, no pain on urination. She was married when twenty years of age, has six living children, and has had two miscarriages, both of which occurred after the birth of the third child and within one year of each other.

Twenty-two years ago the patient began to have pain in the epigastric region after eating food difficult of digestion, or after drinking cold water. For the ten years following she was obliged to be very careful in eating.

The present illness began in 1892, when a sudden attack of intense pain over the lower ribs on the right side and in the stomach occurred. The pain persisted for twenty-four hours and then subsided, only to return with greater severity. These attacks occurred at frequent intervals for three weeks, during which time the patient was confined to her

bed. Her physician, Dr. Illingworth, attributed the attacks to gall-stones and noticed that the patient was somewhat icteric. Since this time the patient has never felt entirely well; she frequently feels weak, and has severe backache and heaviness in the epigastric region, more marked after eating.

The next severe attack occurred October 8, 1894, when the patient had vertigo and pain in the right side, which gradually became more severe and was accompanied by vomiting. The pain began in the region of the gall-bladder, and soon extended to the epigastrium.

The bowels moved regularly, but the movements were grayish-black. Since that time the stools have been grayish and foul-smelling. Since the beginning of this attack the patient has had frequent recurrences of the pain, which would always begin on the right side over the lower costal cartilages, and would soon radiate to the stomach. The attack lasted ordinarily from noon until 10 P.M., and was relieved by morphine. Her sleep has been much disturbed since the attack.

The patient did not notice any icterus until after the pain had commenced, when the skin became "as yellow as wax." There was also an intolerable itching of the skin. After this attack the patient remained in bed for about five weeks. For the two weeks following she had constant pain in the right hypochondriac region and stomach. On January 1, 1895, pain commenced in the back, and the patient felt chilly. A few hours later she had very severe shooting pains in the right side and stomach, and these attacks recurred at frequent intervals for three days. On the fourth day she felt somewhat better, and was up and around, and the next day she entered the hospital, since which time she has had no pain.

The patient has a fair appetite when not in pain, the tongue is not usually coated, but at this time was slightly furred. She states she has lost fifteen pounds in weight since October 15, 1894. Examination of urine showed no abnormality.

Upon examination the patient was found to be rather poorly nourished, the icterus was disappearing, but a slight trace of yellow remained in the conjunctiva. Upon percussion the liver was found to be of normal dimensions. On palpation the liver was felt below the border of the ribs for about one and one-half or two inches, but the border was not distinct. There was some tenderness upon pressure in the region of the gall-bladder, but no tumor nor hardness could be felt in this place. The urine was apparently normal; the last two stools were yellow from bile-coloring.

The patient was prepared for operation in the usual manner and anæsthetized with ether. Upon palpation in narcosis I thought I could feel a rounded resistance in the region of the gall-bladder. With the assistance of Drs. Bernauer, Brown, and Haiselden, and in the presence of Drs. Illingworth, Hecht, and Goldspohn, I operated on January 5, 1895, in the following manner:—

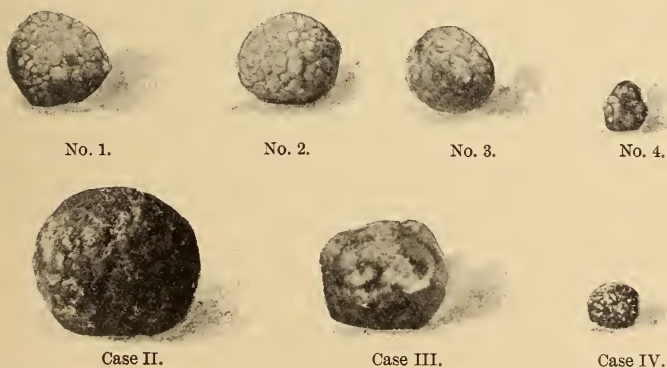
A lateral longitudinal incision was made 10 cm. in length along the outer border of the right rectus muscle through the parietal peritoneum, whereupon I felt a rounded tumor which I thought to be the gall-bladder, but which proved to be the obtuse, rounded border of the quadrate lobe. The anterior border of the liver was rounded and not sharp. The liver was bluish, smooth, and on the upper surface of the convex right lobe there was a whitish, rounded spot 3 mm. in diameter, not prominent

upon the surface, and not hard. The incisuræ between the anterior and right lobes, and between the left and anterior lobes were marked. In the grooves between the quadrate lobe and the right lobe—that is, the groove for the gall-bladder, no gall-bladder could be seen or felt, but the groove was filled with adhesions to the transverse colon.

By blunt separation and division between ligatures I now loosened the transverse colon, but still the gall-bladder did not come into view. The pyloric portion of the stomach was found to be adherent to the lower surface of the liver, and the liver was held up toward the ribs by the second and third fingers of an assistant.

Large, flat sponges were now packed in the abdomen around the field of operation and the wound was held open by retractors. Upon loosening the adhesions of the pyloric portion of the stomach I found a small, empty gall-bladder 4 cm. long and 1 cm. broad, whitish, extending from below the border of the liver 4 to 5 cm. backward to the hilus. The duodenum was pulled upward and to the left away from the lower surface of the atrophied gall-bladder. Blunt dissection with the fingers and Kocher's sound finally permitted me to feel partly through the duodenum, and partly behind it, a nodular mass in the hilus of the liver, consisting of soft, almost immovable glands, and a hard, rounded, movable mass, which was a large gall-stone, and a little nearer to the median line, another semisolid mass, which was the head of the pancreas. As I was uncertain whether the whole mass was carcinoma or gall-stone, and in order to gain further operating space, the abdominal wound was

FIG. 3.



prolonged downward and below the umbilicus, making an incision in all 12 to 15 cm. in length. The colon and omentum were now held down, the stomach held to the right, the liver pushed up, and the duodenum separated from the gall-bladder so that I could get a finger in behind the nodular mass. With the index and third fingers I could now push the mass out into the field of operation. I could not distinguish the hepatic artery, vena porta, or common duct, but I could see large swollen glands the size of almonds. I now explored for the stone with a straight needle, the mass being held forward by my left third finger in the foramen of Winslow, and the stone held firmly in position against the wall of the common duct, whereupon the needle pushed against it gave forth a grating sound.



A longitudinal incision 2 cm. long was now made at the left border of the mass through the loose layer of the hepatico-duodenal ligament, the soft mass of glands and the whitish wall of the common duct, which was 2 mm. thick, to the surface of the stone. The stone, which was rounded, 2 cm. in diameter, finely nodular, and weighed 5 grammes (see Fig. 3), was removed, and my finger then passed readily into the common duct, which had formed a pouch for the stone large enough to admit the finger. One or two drachms of clear yellow bile escaped.

After thorough sponging the ductus choledochus was explored by a curved metal sound, which passed easily upward for 10 to 12 cm., but detected no other stones. I did not, however, succeed in passing the probe into the duodenum through the ductus choledochus, either downward or toward the median line. The wall of the ductus choledochus was thickened from hypertrophy of the muscularis, grayish-red, but not hard or friable. There was no carcinoma. The inner wall of the surface of the dilated ductus choledochus, where the stone was located, was whitish-red, the mucosa normal; neither carcinoma nor ulcer was found. The hilus glands, surrounding the ducts, were enlarged, soft, and reddish from inflammatory swelling.

As bile had already passed down into the bowel, as was seen from the biliary coloring of the last two stools, I desisted from further search for an opening into the duodenum, and proceeded to close the wound in the bile-duct by a double row of extra-mucous silk sutures, as follows:—

First, five sutures through the muscularis of the duct; second, five sutures through the glands and tissues of the hepatico-duodenal ligament. This second series of sutures covered the deeper row. No bile escaped after the first row of sutures had been inserted. I now proceeded to close the field of operation. The bleeding points in the duodenum and elsewhere were first ligated and a Mikulicz drain applied. A glass tube was inserted to the bottom of the wound, and iodoform-gauze packed in over the sutured duct. The upper half of the abdominal wound over the ribs and the liver was united by step sutures; first, separate buried peritoneal sutures, and, second, cutaneous silk sutures, which included the skin, muscles, and sheath of the rectus. The lower border or end of the wound was united by three transperitoneal sutures. The middle of the wound was left open on account of the gauze and glass drain and the usual dressing applied. The operation lasted two and one-half hours.

Five hours after the operation the glass drain contained about  $\frac{1}{2}$  drachm of bloody fluid, which was removed with the dressing and a rubber tube inserted in its place. The gauze drain was not disturbed. On *January 10th* the patient had a slight hemorrhage from the mouth and nose; the blood was bright red and was not preceded by cough. *13th.* Dressing changed, considerable serous discharge somewhat tinged with blood. Faint odor to be detected in the wound. Very little tenderness on pressure except over gauze drain, and some soreness along the stitches in the upper part of the wound. *15th.* Rubber tube and part of the gauze drain removed. *16th.* Wound redressed and more gauze removed from the abdomen. *17th.* More gauze removed and also two stitches. *20th.* Wound dressed and repacked, stitches removed. *February 3d.* The granulations forced out the packing from the wound. The wound was closed until only a sinus about the diameter of the little finger remained. Patient complained of moderate, constant pain on the right side under the lower ribs upon deep inspiration. *9th.* The sinus now is about two inches in

depth, but is very narrow with very little discharge. *March 10th.* The sinus entirely closed. *April 10th.* The patient has gained about 50 pounds in weight, looks very strong, and says she feels entirely well.

REMARKS. *Hemorrhagic Diathesis.* Hemorrhage from the nose and mouth occurred on January 10th, five days after the operation, and on the eighth day the dressings were tinged with blood. The hemorrhagic diathesis is well known in icterus gravis and is also found in the icterus from gall-stone. It is a grave complication, and Courvoisier found 58 cases, in most of which operation was not performed, and in which the hemorrhage was severe and often fatal. He collected six cases in which hemorrhage from the wound of operation in the gall-bladder had a fatal termination. He warns us to search the history of the patient and make careful examination all over the body in order to ascertain whether or not a predisposition to hemorrhage exists, either from the mucous membranes or in the subcutaneous tissues; and in case the patient presents this symptom to abstain from operation, which is likely to prove fatal on account of the uncontrollable hemorrhage from the wound of operation or from other organs.

In some cases, however, in which no symptoms of hemorrhage pre-existed, the operation has been followed by fatal hemorrhage, not from the operation-wound, but from other portions of the body. It seems almost as if the operation brings into active existence a latent hemorrhagic condition. Mermann reports that Czerny lost 7 patients out of 43 upon whom he operated for diseases of the biliary tracts. Three of the seven deaths were caused by cholæmic secondary hemorrhage, which in one case occurred from the intestine, entirely independent of the wound of operation.

CASE III. *First attack of biliary colic five years ago; after third attack frequent slighter attacks of pain and icterus for four months; one year ago, fourth attack with icterus, followed by frequent slighter attacks at intervals of ten days; five months later, cholecystotomy, with no relief; loss of weight, 50 pounds; slight icterus; mucous gall-bladder fistula; cholechothotomy; removal of one stone, one and one-half centimetres in diameter; no leakage of bile; recovery; gained 20 pounds in three months.*

Mrs. R., aged forty years, was admitted to the German Hospital February 10, 1895. Family history good; patient began menstruating at twelve years, always regular, no pain, moderate flow. At age of twenty years had an attack of acute gastro-enteritis with vomiting and diarrhoea, but without pain or icterus. She married at twenty-three years, and has had five children and one miscarriage, the latter probably due to a concurrent attack of measles.

Her present illness began suddenly about five years ago with cramps in the stomach, accompanied by constipation, and vomiting of green, slimy matter. The pain in the stomach lasted about two hours and did not recur for about six months, when a second attack occurred, lasting two to three hours. Since that time she has had similar attacks at irregular intervals. Until 1892 there was no icterus. At this time the

patient had attacks of pain in the region of the stomach and gall-bladder occurring at very frequent intervals and sometimes lasting all night. Icterus was present, which persisted for about four months, but afterward disappeared.

In the winter of 1893 the patient, who had been ill in the interim, had another attack, not so severe as the former ones and without icterus, but the stools were gray. The patient was confined to her bed for about a week and then felt better, until April, 1894, when the attacks again recurred every three or four days, with pain in the region of the stomach and gall-bladder, but most severe in the lower dorsal region. About two days after each attack the urine was brown, the icterus intense, and the stools gray. The icterus varied in intensity with the severity of the pain. After a few weeks the attacks occurred only every ten days, but continued during the entire summer. In September, 1894, Dr. Wiener operated, making a right lateral incision, and removed one stone about the size of a hazelnut from the gall-bladder. Patient remained in bed for five weeks after the operation. She obtained no relief from the operation, and all the symptoms returned.

*Present condition.* Patient was anæmic, rather poorly nourished; had lost about fifty pounds in weight in the last five months. The skin and sclerotics were slightly icteric, stools clay-colored, heart and lungs negative; pressure over the lower border of the liver and the median line caused considerable local pain and also pain in the back.

There was a longitudinal cicatrix 7 cm. long along the border of the rectus muscle over the gall-bladder, and a small fistulous opening from which a clear, viscid mucus exuded, a few drops at a time, which, upon examination, was shown to contain pus-corpuscles.

On February 21st, I operated with the assistance of Drs. Bernauer, Brown, Haiselden, and Gottschalk, in the presence of physicians from the Polyclinic. Ether was the anæsthetic. The fistula, which was 5 cm. in depth, was scraped and closed with a silk continuous pouch-suture. An incision was made around the fistulous opening 1 cm. therefrom. The incision was then carried up above the border of the ribs and down through the old cicatrix. The peritoneal cavity was opened 5 cm. below the fistula, and, guided by the finger in the abdomen, the fistula was excised and left connected with the gall-bladder. The right lobe was an elongated corset-lobe. The transverse colon and pylorus were adherent to the gall-bladder and hilus. These adhesions were broken up, and palpation showed the gall-bladder to be contracted and empty, containing no stone, nor could a stone be felt below the gall-bladder in the cystic duct. The adhesions were now loosened from the anterior surface of the hepatico-duodenal ligament, and its free right border, the entrance to the foramen of Winslow, isolated so that the index-finger of the left hand could pass into the foramen along the posterior surface of the hepatico-duodenal ligament. Upon palpating the ligament of the liver down to the duodenum I could feel a movable rounded stone the size of a hazelnut, which would slip away from my fingers up to and into the hilus of the liver. By passing the finger high up on the posterior surface of the hepatico-duodenal ligament I could feel the stone in the hilus and could move it down, forward, and to the median line as far as the border of the duodenum and even a little behind its right border. The stone could move in the dilated ductus choledochus for 6 or 8 cm. I could fix the stone



between the index-finger on the posterior surface of the hepaticoduodenal ligament and the thumb on its anterior surface, and push the stone against the wall of the ductus choledochus at the right free border of the hepaticoduodenal ligament. Upon pressing the stone against the wall of the duct in this place I could see the enlarged white stone shining through the dark-red peritoneal covering of the ligament. I could feel the hepatic artery across the median line about 2 cm. from the free border of the ligament, and to the right of the hepatic artery I could see a bluish band running longitudinally in the ligament from the hilus of the liver to the left of the duodenum; this was probably a branch of the vena porta.

The abdomen was packed with large, flat sponges, one between the right lobe of the liver and the diaphragm, one over the pylorus and stomach, and one over the upper surface of the transverse colon and omentum.

Fixing the stone against the anterior surface of the hepaticoduodenal ligament close to the duodenum, 1 cm. from the entrance to the foramen of Winslow, I made a longitudinal incision 1 to 2 cm. long down to the surface of the stone (see Fig. 5), which was then lifted out with a sharp spoon, as I wished to avoid crushing the stone; a moderate flow of light-yellow, transparent bile followed.

An assistant now held the liver up against the diaphragm with both hands, one on the right lobe and the gall-bladder, and the other on the left lobe. This hand also pushed the stomach upward and to the left. Another assistant with two fingers of the hand held down the transverse colon. Thus I obtained space for suturing the longitudinal wound in the duct. The duct was now explored by probe, elastic bougie, and finger. The probe and elastic bougie passed up 8 or 10 cm. into the hilus of the liver, and down 4 or 5 cm. behind, but not into the duodenum. The dilated duct easily admitted my little, third, or index-finger to a distance of 5 cm. upward into the hilus, where no stone could be felt, and 4 cm. downward behind the duodenum into a pocket which ended blindly like the finger of a glove.

The wound in the ductus choledochus was closed by, first, a row of six mucosa sutures (the ends of which were left long) through the muscularis and mucosa, which was smooth and pale yellow from bile, and, second, an outer row of Lembert serosa sutures  $\frac{1}{2}$  cm. from the first row, taking in 2 to 4 mm. of the serosa. After six of these sutures had been inserted there was a flow of bile from the lower corner of the wound. The ends of the inner row of sutures were cut short and four additional Lembert sutures applied, after which the flow of bile ceased, and I considered the canal hermetically closed.

The skin and abdominal wall over the fistula into the gall-bladder and down to the surface of the liver were now excised. The fistula was narrow; a silver probe was passed down 5 cm., but a bougie or elastic catheter 2 mm. in diameter could not be passed down until I had dilated with Lister's forceps. The catheter was left in and the border of the fistula united to the skin. The toilet of the abdomen was performed as usual. The drainage consisted of, first, a Mikulicz drain of iodoform-gauze surrounding a glass tube, over and upon the sutures of the ductus choledochus to the hilus of the liver; iodoform-gauze was packed over the pylorus and down on the duodenum; second, an iodoform-gauze strip along the gall-bladder or fistula out of which a few drops of clear, transparent bile escaped.

The wound was now united by a row of silk sutures through the whole abdominal wall.

The operation occupied two hours; the patient was in good condition at its close; pulse 110.

Five and one-half hours after the operation no fluid was found in the tube, which was, therefore, removed. The patient has no pain upon high percussion over the abdomen, but complains of pain in the stomach. *February 22d.* The patient feels weak and passed gas by the anus; complains of pain in the wound; has vomited dark-green matter, the vomiting of which causes an intense burning to the throat and mouth. *28th.* Wound dressed. Wound in good condition and apparently no bile. Packing removed and replaced. *March 3d.* Wound dressed; a portion of the packing removed from the wound. Considerable sensitiveness on pressure over the lower part of the wound apparently caused by a tight suture, which was removed. Pain ceased immediately after dressing. *8th.* Stitches removed, considerable pain on pressure along lower border of wound. Small drainage-tube in the gall-bladder was removed and sinus packed. No bile on dressings. *12th.* The icterus has almost entirely disappeared. Patient feeling well. All of the gauze removed. The entire index-finger can be introduced into the wound leading to the duct. Very slight amount of discharge, consisting principally of blood, which followed the removal of the gauze packing. *April 20th.* The patient has gained seven pounds in weight since operation; is very much stronger. The sinus is small and closing in rapidly, and the discharge slight. The patient gained twenty pounds in weight in three months after the operation, and is now in perfect health.

REMARKS. The opening of the ductus choledochus was 1 cm. above and to the right of the duodenum, and was 2 to 3 cm. long. When the stone was removed it was found that the wall was not thickened, and clear yellow bile flowed out. The probe and elastic bougie could be passed upward in the hilus of the liver 10 cm. and down behind the duodenum 5 cm., but it may be that the bougie was flexed in the duct.

The ductus choledochus was so dilated that it would admit the little and even the third finger easily. The wall was smooth; no more stones could be felt. The finger could be passed 5 cm. up to the hilus without reaching the upper end. The finger passed downward behind the duodenum, entered a pocket 2 to 3 cm. deep, with a smooth wall, in which I could feel no stone, and through which neither finger, flexible sound, nor elastic bougie could be passed into the intestine—exactly the same conditions as in the previous case.

Six mucous sutures were first inserted, and then ten sero-muscular, buried sutures, because of the clear, light-yellow bile which exuded all the time between the sutures first introduced.

A probe passed through the gall-bladder was arrested somewhere in the cystic duct; it did not go down into the ductus choledochus. I could feel no more stones in the ductus choledochus, cystic duct, or the gall-bladder. At first nothing but a clear watery fluid passed out of

the gall-bladder, but later there was a discharge of bile. A small drain was passed into the gall-bladder, the end of which was united to the skin. A Mikulicz drain was inserted down to the sutured wound in the ductus choledochus. The operation lasted two hours. I could see the yellow-spotted stone shining through the wall of the duct when pressed against it by two fingers behind the hepatico-duodenal ligament and the thumb on its anterior surface. The stone moved easily for 6 to 8 cm. in the ductus choledochus, from the hilus of the liver down to the pocket behind the duodenum. Sometimes it slipped up out of reach into the hilus of the liver, but could be brought down again by pushing the fingers behind the hepatico-duodenal ligament high up into the hilus of the liver. The stone could also be pushed down near the duodenum and to the right free border of the hepatico-duodenal ligament, the fingers being in the foramen of Winslow.

I thought that I could see the vena porta as a blue band about 1 cm. broad, and that I punctured it with the needle; but the bleeding stopped as soon as the sutures were tied. Hereafter in operations of this character I shall employ fine, curved, round-pointed needles and fine silk. The ends of the inner sutures should be kept long in order to make traction on the wound when the outer sutures are introduced. Straight needles cannot be used, as the bottom of the wound is deep and the operating-space narrow. The liver must be held up by both the index and third fingers of an assistant.

It is not necessary to find the opening into the duodenum, and this is often impossible; it could not be found in either of my two cases. The icterus was intermittent, and there was no inflammation of the wall of the duct. The choledochus stone could be moved for 8 or 10 cm. and obstructed the flow of bile like a ball-valve.

*CASE IV. Biliary colic and icterus two years ago; frequent attacks of indigestion and pain in cardiac region for two years without icterus; then second severe attack with icterus; later very frequent slight attacks twice a week; fever; loss in weight, 25 pounds in twelve days; slight icterus; no tumor in region of gall-bladder; operation; extensive adhesions over atrophied and empty gall-bladder; choledochotomy; removal of four stones; recovery; gained 40 pounds in forty days.*

H. J. W., American; weight, 140 pounds; height, five feet eleven inches; married; occupation, dial-maker. Family history good; no trace of hereditary disease. For the past two years the patient has been working in the baking-room of the dial department of a watch factory, where the heat is so intense that it can be endured for a few minutes only, and the men are obliged to work in relays. For eight years previously he had worked in the dial department. Patient's habits are good, he lives a simple life, smokes an occasional cigar, and at rare intervals drinks a glass of beer. So far as he knows he has not been exposed to accidents or contagion in any form. With the exception of the ordinary illnesses of childhood he has always been well until



three years ago, when he had a very severe attack of typhoid fever, from which he recovered, however, without complications.

The present illness commenced in August, 1893, when the patient had a sudden attack of pain in the region of the gall-bladder, accompanied by chills, fever, very intense pain, and marked jaundice. The jaundice gradually passed away, but from that time until February 5, 1895, he had frequent attacks of what he supposed to be indigestion or gastralgia, which were always sudden in onset, attended by severe pain, occasionally nausea, no vomiting, sometimes by chills and fever, and apparently independent of the food taken or the time of day. On February 5th, while at work, he was suddenly seized with severe pain in the region of the gall-bladder, chills, fever, but no vomiting. Within twenty-four hours intense jaundice appeared and marked constipation. He was seen by Dr. Webster on February 17th, and at that time, although enormous amounts of cathartics had been taken, his bowels had not moved for ten days. The jaundice was intense, the pain not severe, temperature  $101^{\circ}$ , tongue coated, a bad taste in the mouth, no vomiting, occasional sweats, urine limited in quantity and containing a large amount of bile. The patient lost about twenty-five pounds in weight in the twelve days intervening between the attack and the time he was seen by Dr. Webster, and averaged two attacks a week, which were preceded by a vague uneasiness, and were always accompanied by a chill, temperature as high as  $102\frac{1}{2}^{\circ}$ , pulse 60, sweating, marked increase in the intensity of the jaundice, increase of bile in the urine, and very light stools. The pain persisted from a few minutes to an hour or more, was always quite severe, and the patient learned from experience that relief was more quickly obtained when he lay on his abdomen.

In the intervals between the attacks the jaundice faded, but did not disappear entirely; the urine became lighter in color, but always contained bile; the feces were darker. Itching of the skin was annoying and constant.

*Present condition.* Inspection shows a fairly nourished body. Jaundice well marked, though not so intense as at any time since February 5th; stools light colored, but very much darker than during or a day subsequent to the attacks. Urine normal in amount, specific gravity 1020; no albumin, sugar, or casts; urea 0.017 per cent., strongly acid, and contains bile. Blood contains 78 per cent. hæmoglobin; pulse in sitting posture 60. Heart normal; respiratory system normal. Nervous system—the patient is cheerful and hopeful, although the characteristic despondency has been present, but without great melancholia, nausea, or severe manifestations of nervous perturbation. Digestive system—tongue is less coated than previously, bad taste in the mouth, worse during attacks. Appetite—can eat but simple, light food at intervals between attacks. Slight eructations, considerable nausea but very little vomiting, but none during the last few days. The bowels have moved under small doses of sodium phosphate. Patient has never had piles nor bloody stools. There is no enlargement of glands, the liver is normal in size, and there is no apparent enlargement of the gall-bladder.

On April 14th, I operated at Mercy Hospital, in the presence of Drs. Morgan, Roler, Raymond, Webster, Billings, Andrews, Black, and Thiel. Upon inspection the patient was rather lean, skin of yellowish tint, but not exactly icteric; conjunctiva slightly yellowish. Ether was the anæsthetic, and was given by Dr. Weir.

*Operation.* A lateral longitudinal incision, 18 to 20 cm. in length, was made at the outer border of the right rectus muscle from above the border of the ribs to below the umbilicus. After packing with flat sponges the parietal peritoneum was sutured to the skin. Upon examination I found that the liver was drawn or extended more to the right than normal, so that the suspensory ligament of the liver and part of the left lobe presented in the middle of the lateral wound. The wall of the stomach presented below the liver; the groove for the gall-bladder was situated to the right of the wound and could not be brought into view without extending the field of operation to the right, and therefore a transverse incision, 6 to 8 cm. in length, became necessary. I could now reach the groove for the gall-bladder—the incisura between the right and the anterior lobe. At this point was found a cord-like adhesive band,  $1\frac{1}{2}$  cm. broad and 8 mm. thick, binding the liver to the abdominal wall, which was probably the cause of the abnormal position and retention of the liver. This band was cut after double ligation and transfixion.

The gall-bladder could not be seen, as the incisura was filled with omentum, the wall of the stomach and the lesser curvature of its pyloric portion, which was at this point adherent to the liver and omentum.

The division of the omentum between double ligatures did not bring the gall bladder into view, but exposed the transverse colon. The division of the ligamentum hepatico-gastricum made it possible to push the stomach to the left, there to be retained by a flat sponge. The loosening of the colon by division of the ligamentum gastro-colicum finally brought the gall-bladder into view. It was empty, contracted, 2 cm. broad and 4 cm. long, and whitish. Upon blunt dissection backward with the finger and Kocher's sound, the hilus of the liver with the foramen of Winslow were laid bare, and also the bile-ducts and descending portion of the duodenum.

I could now feel a movable stone at this point, and could insert the index and third fingers into the foramen of Winslow behind the hepatico-duodenal ligament, and grasp between these two fingers and my thumb the vena porta and bile-ducts. With the fingers of my right hand I pushed the duodenum to the left and could feel two movable stones which glided from right to left in the common duct with absolute ease and freedom. They could be dislodged to the left down behind the duodenum and then could be pushed upward and to the right into the hilus of the liver. A slightly enlarged lymph-gland lay on the anterior surface of the common duct. The vena porta could not be seen. After packing with more sponges the first stone was now pushed down to the left and fixed in position against the anterior wall of the common duct close to the right border of the duodenum. An incision, 1 cm. long, longitudinal to the axis of the common duct, was now made on the upper aspect of its anterior surface down to the stone, whose yellowish-white nodulated surfaces presented in the wound. Transparent light-yellow bile flowed out of the incision, from which Dr. Black took cultures, but which he found to be sterile. A round stone (see Fig. 3, No. 1) was lifted and pressed out of the opening with the help of Kocher's sound, which was passed into the duct behind it. This stone was globular and 14 mm. in diameter. A second stone of the same size and shape was now removed; also a third stone a little smaller, probably 12 mm. in diameter.

I now explored the common duct with my little finger, which passed down behind the duodenum 2 cm. into a smooth cul-de-sac in which I could feel no stone. I then passed the finger upward for 2 cm., when it was grasped rather tightly by the walls of the duct, but here also no stone could be felt. A silver probe was now passed first downward, which did not enter the duodenum, and then upward for 8 cm., not into the gall-bladder, but into the hepatic duct. On withdrawing it I felt a grating as of a stone, and manipulation between the fingers of the contents of the hepatico-duodenal ligament brought forth a fourth stone smaller than the preceding, globular, about 6 mm. in diameter.

An elastic olive-pointed bougie, No. 10, American, was now passed into the common duct, first downward, when it entered the duodenum and could easily be passed down its entire length; then upward about 10 cm. into the liver, but not into the gall-bladder. The wall of the common duct was normal, but was rather thinner than usual.

The wound in the common duct was now sutured, first by mucous membrane sutures; the mucosa was reddish-grayish white, soft, with longitudinal folds. It was held with forceps, three silk sutures applied, upon the knotting of which the flow of bile almost ceased; second, the sero-muscular sutures which took in 4 mm. of the outer layer of the wall with its covering-layer of hepatico-duodenal ligament. Five sutures were first applied, but the flow of bile was rather increased than diminished, and bile was seen to come out of the needle-punctures. Two or three more sutures were applied obliquely and transversely to the others in the axis of the common duct, but even then the oozing of the bile did not completely stop. As I considered that when the pressure on the ducts and the liver which, was being held up with some difficulty by two assistants, was relieved, the flow of bile would stop, I resolved to close the wound.

Boric-acid gauze was packed in the hilus of the liver over the common duct, the six large abdominal sponges removed and one large clean sponge spread over the abdominal contents behind the wound in the abdominal wall.

The abdominal wound was closed by suture of the divided muscles in the transverse wound with buried silk sutures, and then by heavy transperitoneal sutures through the entire wall to the skin.

A rubber drainage-tube 1 cm. in diameter was passed up to the wound in the common duct; borated gauze packed in above the surface of the tube on to the hilus of the liver and also below the surface of the tube, and the abdominal wound left open for 4 to 5 cm. The wound was then dressed in the usual way.

The operation lasted an hour and a half; the pulse became better and stronger during the latter part of the operation.

The next day the outside dressings were removed and were found to be thoroughly saturated with bile, probably 10 to 12 ounces, and renewed.

On *April 17th* the wound was again dressed. The deeper layers of the dressing were soaked with bile, but probably not more than 2 or 3 ounces. The wound looked well. *18th.* The bowels moved spontaneously, the feces were ochre-brown in color. *20th.* There was very little discharge of bile until the patient was turned on the right side, when the dressing became soaked in about half an hour with probably 3 or 4 ounces of a greenish-yellow fluid. *21st.* When the



patient was turned on the right side the discharge again became profuse, and soon assumed a fermentative odor. When the wound was redressed, the discharge in the upper layers of the dressing had a sour, fermentative odor, but the dressings next to the wound were sweet, the discharge resembled warm digesting milk, but was not of an intestinal character. The packing was now removed, and the wound found to be in healthy, granulating condition. A little stitch-necrosis was present. The superficial stitches were removed, the wound washed with a saturated solution of boric acid, and repacked lightly. 22d. After an enema of magnesium sulphate, the bowel-movement was of a dark greenish color. 23d. The wound was redressed; about half an ounce of discharge was found on the proximal dressing, very slightly sour in odor, and chylous in appearance. The drainage-tube was removed and found plugged at the bottom with a mass of pressure-necrosis material. The tube was not replaced. The wound was irrigated with warm saturated solution of boric acid and lightly repacked with borated gauze. 25th. The wound was redressed; about 3 ounces of discharge of the same chylous appearance as before, but with a great admixture of bile, appeared on the dressing. Upon removal of the dressing 3 or 4 drachms of odorless pure bile floated down on the surface. Streak and stab cultures were made from both the chylous-like discharge and from the bile, both of which were negative.

On April 28th Prof. W. E. Morgan made the following report:

"The patient still discharges through the wound and from the duct a quantity of the chylous-appearing fluid, and for the past two days a considerable quantity of bile also, 2 to 3 ounces in twenty-four hours. As it occurred to me that the fluid might possibly be pancreatic in origin, I subjected some of it to a physiologic chemist for examination, and enclose his report. The discharge in question certainly comes from within the duct, and not from the surface of the wound, for I have been able at the last two dressings to watch its accumulation in the deepest part of the wound. At first, it looks like a coarse emulsion of fat in water, then slowly separates into two layers, the deeper one milky in appearance, the upper one like clear bile. I would naturally think the oily portion would be lighter in specific gravity, but perhaps the admixture of mucus may make the deep layer heavier; it certainly is more adherent. The patient is doing well."

Report of chemical examination of the discharge by Dr. Charles H. Miller:

"Source: liquids obtained by washing out the dressing.

"A. *External Dressings*. The dressings were colored green from the dried discharge, which had ascended highest from more perfect capillary attraction. On washing, obtained 350 c.c. green liquid of neutral reaction with a specific gravity of 1.016, which contains a considerable quantity of bile, traces of serum-albumin, and practically nothing else.

"B. *Internal Dressings*. The internal dressings, especially those used for packing the wound, yielded 200 c.c. of a yellowish-white, creamy liquid of slightly acid reaction, due to lactic acid. Specific gravity, 1.023. On standing, this gave a heavy white precipitate containing pus-corpuscles (Donné's test). The supernatant liquid is strongly albuminous, and contains mainly serum-albumin with a small amount of peptone.

"Bile was present in small quantity; chlorides; phosphates, as salts of

the alkali; urea, in minute traces only; fat, traces only; blood, in minute traces only (guaiac test); sugar was not present.

"The results of the approximate analysis would indicate that the liquid is a mixture of lymph and bile containing large numbers of pus-corpuscles. The examination was made twenty hours after the liquid was obtained. The trace of acidity is attributed to bacterial decomposition after removal from the body."

On November 9, 1895, I received the following report from Dr. Webster:

"In reply to your inquiry regarding my brother's health, I am pleased to write you that he gained forty pounds in weight in forty days after leaving the hospital, and has not missed one hour's work since recovery."

**REMARKS.** The operating-space was small and the application of sutures in the common duct difficult. For this purpose small, rounded, curved needles are necessary. If the wall of the duct is thin or normal, it is not easy to close the duct hermetically.

The liver was normal in color, little if any enlarged, and its borders were not rounded. On the upper surface of the right lobe I could feel numerous (fifty or more) small superficial, hard or resistant nodules from the size of a pin's head to that of a split pea. They could be seen as slight prominences over the surface of the liver. The liver-tissue was perhaps a trifle darker than normal, but neither whitish, yellowish, nor green. When I felt these nodules before I had found the stone in the common duct, I feared they were malignant metastatic tumors in the liver, due to a primary tumor somewhere around the hilus; but their large number, uniformly small size, and color made me consider them peripheral dilatations of the small bile-ducts. This was made certain by finding stones in the common duct. The nodules were not distributed all over the liver, none could be found on the lower surface; they were limited to a territory the size of the palm of the hand on the convex surface of the right lobe, and each was almost in contact with the others. My belief is that a large branch of the hepatic duct had been occluded by a stone, possibly by the smaller one (No. 4), or a stone which I did not discover. It may thus be well, as was done in this case, to pass an elastic bougie or probe and attempt to dislodge a stone situated higher up in the larger ducts of the liver. The increased flow of bile toward the end of the operation, at the time of incision and suture of the common duct, may have been due to the successive evacuation of a distended and overburdened territory of peripheral bile-ducts, and it is more than likely that the creamy fluid so abundantly discharged in the early part of the after-treatment was the contents of these dilated peripheral bile-ducts, which contained not bile, but an acholic serous fluid.

The peculiar nodulated condition found in the lower right half of the

upper surface of the right lobe of the liver was due to dilatation of the distal ends of the bile-ducts. Courvoisier mentions one case in the literature, in which the superficial branches of the bile-ducts presented a varicosed appearance (*loc. cit.*, p. 56), and four cases in which the superficial terminal bile-ducts were transformed into small cysts the size of a cherry, protruding from the convex surface of the liver. It is natural that large quantities of bile should be evacuated even during the operation, after the opening of the common duct, and that the flow of bile should be considerable for several days thereafter. In such cases it might be advisable not to close the common duct entirely so that evacuation of bile might be permitted through the wound.

Another remarkable phenomenon observed in this case was the discharge of large quantities of a milky fluid which did not contain bile-pigments, and which was characteristic of the acholic condition. Courvoisier found in the literature ten cases of hydrops of the biliary ducts, which were filled with a watery, colorless, or slightly mucoid fluid which did not possess any of the characteristics of bile. In these ten cases the entire system of the biliary tract, possibly with the exception of the gall-bladder, was filled with a hydropic fluid of this nature. In none of these ten cases was the obstruction due to stone, but to tumors within or outside of the common duct, or to obliteration of the duct in one case. He explains the acholia by assuming that cessation of the secretion of bile may under certain circumstances be caused by high pressure on the liver-cells due to the stagnation of bile behind the obstruction. In this case the acholia was partial, and was caused by a stone, probably a small stone, which was at last removed and dislodged by introduction of the probe high up through the hepatic duct into one of its branches. This phenomenon is remarkable in both these respects, as it is the only observation of the kind on record.

As the patient has had no disturbing symptoms up to the present time, eight months after the operation, and as the acholic territory became entirely empty shortly after the operation, it is not likely that a stone which had not been removed could have caused the localized dilatation of the ducts, nor that the acholic fluid could have come from any other territory than that of the dilated ducts. Prof. Morgan thought that the fluid might be pancreatic, from division of the pancreatic duct during the operation; but the incision in the common duct was nearly an inch from the pancreatic duct, and the fluid was shown to be non-pancreatic by the chemical examination made by Dr. Miller and reported above.

When it is impossible to close the common duct by suture so that no bile escapes, thorough drainage is important, namely, a rubber drain up to the sutured wound in the duct, carefully packing gauze around it, not only in the hilus, but out toward the stomach to the left, toward the



flexure of the colon to the right, and to the transverse colon downward. This packing should be done before the closure of the abdominal wall is commenced, while the liver is still being held up by the assistants so that the nooks and corners to be packed may be clearly seen; a sufficiently large opening should also be left in the abdominal wound to allow free exit for the bile, through the tube and packing.

*CASE V. Six attacks of biliary colic since December, 1894, the later ones followed by icterus; frequent short attacks of pain in epigastrium; slight icterus; loss of weight, 23 pounds; no tumor in region of gall-bladder; diagnosis, stone in common duct; operation; adhesions to gall-bladder; enlarged glands in hilus; no stone found; change of diagnosis to malignant tumor in head of pancreas; cholecystenterostomy with Murphy button; death on fourth day, probably from cholæmia; autopsy, no malignant tumor; small gall-stone size of a cherry-stone found in diverticulum of Vater.*

P. W., railroad-clerk, aged twenty-five years, was admitted to Emergency Hospital, May 18, 1895. Family history negative, with the exception of his paternal grandfather, who, in the course of an illness of three weeks, during which he was much jaundiced and had excruciating pain in the region of the liver, passed a number of gall-stones.

The patient had the ordinary diseases of childhood, and has had two attacks of gonorrhœa. He also had typhoid fever five years ago. He seldom drinks liquor, never to excess; uses tobacco sparingly; has a good appetite, and no cough. Has never suffered from any accident; is generally constipated.

The present illness commenced in December, 1894, when he was awakened early one morning by a slight, dull aching pain in the epigastric region. The pain continued quite severe in character, notwithstanding a warm compress, for about nine hours, when it suddenly disappeared. This time he did not notice that he was jaundiced. The character of the pain in this attack was somewhat paroxysmal. Each paroxysm would last from ten to fifteen minutes and would be followed by an interval of from half an hour to an hour and a half. The second attack occurred about the last of February, 1895. It commenced early one morning. The pain gradually increased in severity, and then suddenly disappeared exactly as in the former attack. This attack lasted about twelve hours, but for six or seven days afterward he felt more or less ill, and his appetite was poor. He did not notice any jaundice. The pain was localized in the epigastric region in a territory about three inches in diameter. The third attack occurred on March 28th. In the morning of that day he had a disagreeable feeling accompanied by fleeting pains in the epigastric region. In the afternoon he felt cold and chilly, but had no distinct chill. About 3.30 P.M. the pain began to increase rapidly in severity and soon became intense. After about fifteen minutes it suddenly disappeared. About two hours later he had another paroxysm, but not so severe as the first. This attack was not accompanied by jaundice. Three days later, while he was on his way home, he vomited three times on the train and perspired profusely. He had no pain, but had three very loose movements of the bowels. The next day he did not feel well, but had no pain.

The following day the fourth attack seized him and persisted for two

hours and a half, but was not so severe as the former attack. During this attack he was not jaundiced, but his face was discolored. The day after this attack he was decidedly jaundiced, and the urine was very dark. He had painful attacks once or twice during the day. During the succeeding ten days he had an attack of pain every day, which lasted from half an hour to two hours, at the end of which time it would suddenly disappear. The jaundice was noticeable for about a week after its appearance. At the end of this period of ten days the pain continued in a less severe form for about five days. On April 19th he had a very severe attack which lasted about three hours, and for two weeks thereafter had less severe attacks of pain each day. The pain was always included in a space in the epigastric region, about three inches in diameter.

During the two weeks preceding his admission to the hospital he had three attacks of pain. The first two were not severe, but the last attack, which occurred on May 14th, lasted for twelve hours. For the first four hours of this time it was not especially severe, but from this time on there was constant pain of varying intensity. He vomited three times during this attack, while the pain was at the maximum, and the vomiting was followed by a cessation of pain for about half an hour. He was distinctly jaundiced after this attack.

The character and intensity of the pain were varied by the patient's position. If he lay on either side or on his stomach, the pain was increased. When he would lie on the back, with the right thigh flexed to a right-angle, and the left leg drawn up and thrown across the right thigh, or with both thighs flexed as much as possible, or when he would sit up in bed and draw the knees up to the chin, the pain was less severe. The patient never tried to stand erect.

After the third attack the urine became very dark and continued so for about ten days. After the next attack the duskiness of the urine continued for about five days. On May 14th it again became very dark, and has remained so up to the present time. On May 17th he had another slight attack, which lasted only two or three minutes. During the attacks of pain pressure of any kind was intolerable, and any noise or jarring in or around the room seemed to increase the pain; pressure during the free intervals, however, was not attended by pain.

The patient's usual weight is 165 pounds, but on April 15th he weighed only 142 pounds, a loss in weight of 23 pounds.

No stones have ever been found in the feces.

*Diagnosis before operation.* As the patient had had six distinct attacks of gall-stone colic, increasing in severity and duration, and increasing also in frequency; as the pain was located in the epigastric region, and not in the region of the gall-bladder; as icterus of medium degree followed the later attacks; as marked emaciation (a loss in weight of 23 pounds) was present; and as there was an absence of tumor or pain in the region of the gall-bladder, I made a diagnosis of floating gall-stones in the common duct, feeling certain that this was a typical case, as all the characteristic symptoms were present. I therefore advised operation.

*Operation.* After the usual preparations the operation was performed on May 10th. The patient was anesthetized by ether, an incision was made over the gall-bladder, extending downward from the lower border of the costal arch to the level of the umbilicus through the skin and super-

ficial fascia. The rectus muscle was then separated by blunt dissection, and an opening made in the peritoneum, which was enlarged to the limits of the wound. The peritoneum was sutured to the skin, and the intestines protected by large flat sponges. The wound was now enlarged upward to the costal cartilages and downward to half an inch below the umbilicus. Extensive adhesions existed between the liver and the surrounding organs. These adhesions were loosened with considerable difficulty by blunt dissection or division between ligatures, and the common duct, artery, and vein could be felt by the examining finger passed through the foramen of Winslow. Careful palpation of the common and cystic ducts was negative, as no stones could be felt. The liver was then palpated, and hard, round nodules were found on its surface, which felt like dilated hepatic ducts. The head of the pancreas was enlarged, and I was inclined to attribute to this fact the symptom of jaundice due to pressure upon the common duct. Some enlarged lymphatic glands were found, one as large as a horse-chestnut. One of these glands was removed for examination. To determine the patency of the common duct, a flexible sound was passed down through an incision into the gall-bladder, through the cystic duct into the common duct, and finally into the duodenum.

I now made a diagnosis, which afterward proved to be erroneous, of malignant disease of the head of the pancreas. I therefore attached the gall-bladder to the jejunum by means of a medium-sized Murphy button. This procedure was attended with extreme difficulty on account of the small calibre of the atrophied gall-bladder. The abdomen was then thoroughly cleansed, and two strips of gauze inserted, one above and the other below the point of anastomosis. The abdominal wound was closed with interrupted sutures, which were passed through the entire wall. One of these sutures was placed, but not tied. The ordinary dressings were now applied. The operation occupied two hours.

Twenty-four hours after the operation the temperature began to rise, and four days later reached  $104^{\circ}$ , attended with vomiting, pain, a dry tongue, with no tympanites. The patient died on the fourth day.

*Autopsy.* Upon opening the abdomen no diffused peritonitis was found; the gauze in the hilus was adherent to the surrounding intestines and stained with bile. There was no leakage from, or peritonitic exudate around, the cholecystenterostomy. The liver, together with the stomach, duodenum, pancreas, and a loop of jejunum at the site of the anastomosis, was removed entire.

The liver was of normal size and appearance; the atrophied gall-bladder was united with the jejunum by a perfectly tight agglutination at the place of anastomosis.

Careful palpation of the hepatico-duodenal ligament failed to detect any stone or dilatation of the common duct. The pancreas was normal on palpation, and its head did not now appear enlarged, nor were any nodules nor abnormally hard territories to be felt in it.

I now opened the duodenum by a longitudinal incision over the head of the pancreas in order to examine the duodenal opening of the common duct. The inner surface of the duodenum appeared normal, and presented the usual transverse folds. On the inner surface of the posterior wall of the duodenum at the point where it crossed the head of the pancreas, I could now see a small, round polypus, one centimetre in diameter, movable freely from side to side, but less movable in a vertical



direction; it was covered with mucosa, and was attached to the duodenum posteriorly by a broad base. I supposed this to be a small sub-mucous lipoma or fibroma, protruding like a polypus into the lumen of the intestine. Upon closer examination, however, I found on its convex surface, near the upper end, the opening into the common duct. A sound passed easily from this opening into the duct, which appeared of about normal calibre. On passing the sound through the opening in the duodenal mucosa I felt a slight grating as from a stone at the location of the supposed polypus. I now made an incision from the opening downward through the mucosa covering the polypus, and found a gall-stone the size of a cherry-stone (see Fig. 5) in the supposed polypus, which was thus shown to be the diverticulum of Vater dilated downward so as to form a small pouch wherein the stone was contained. There was ample room over the stone to allow the passage of a bougie No. 14, French scale, in the common duct, as had been done during the operation. No other stones were found in the common duct, cystic duct, or gall-bladder.

Microscopic examination of the liver showed a slight degree of fat-infiltration of the liver-cells, most of which contained one or more oil-globules, not large enough, however, to fill the entire liver-cells, the contour of which could almost always be recognized. The branches of the hepatic vein at the centre of the acini were somewhat dilated. The smallest bile-ducts could be seen to be not dilated, and to have normal epithelium. Around the periacinous branches of the vena porta there was slight infiltration with leucocytes, but this did not extend from the paravascular spaces out into the acini between the rows of the liver-cells.

It was thus seen that a slight degree of beginning interstitial hepatitis and a medium or slight degree of fat-infiltration were the only abnormal conditions to be found in the liver.

REMARKS. As I found the gall-bladder small, empty, and retracted, surrounded by the usual characteristic adhesions, I confidently expected to find a stone in the common duct, and was greatly surprised to find no stone upon palpation of the hepatico-duodenal ligament. The large lymph-glands in the ligament were soft; this might have been from inflammation, as in case of choledochus stones, but might also occur as a result of sarcoma. As I now found the head of the pancreas unusually large and firm, I changed my diagnosis, and thought of a tumor—a carcinoma or sarcoma—in the head of the pancreas, which had caused the intermittent paroxysms by compression of the common duct in its course through the head of the pancreas. I therefore opened the gall-bladder, first, to determine the patency of the common duct, and, second, to establish a cholecystenterostomy. As the flexible olive-pointed bougie passed easily down into the duodenum, I thought that no stone could be present, and that the bougie might have passed by a tumor in the head of the pancreas large enough to make compression of the common duct. I resolved upon cholecystenterostomy, because I expected the tumor in the head of the pancreas to increase in size and gradually to cause more compression.

The stone, covered with the soft wall of the diverticulum of Vater, was so small as to escape detection even after the duodenum was opened at the autopsy. If I had used a metallic instead of a flexible sound, I might possibly have detected the stone by the grating sensation at the location of the diverticulum of Vater. Had this been the case, I would have been able to remove the stone either from the ordinary incision in the common duct or from the duodenum, after incising the latter.

The small stone found in this case had a rather roughened, crystalline surface, with sharp, jagged points, or rather wavy ridges, like a fine saw. It imparted a feeling of grating or scratching when rubbed over the skin of the dorsum of the hand. It is possible that this stone would cause more destruction of epithelium and subsequent inflammation than the smooth stones found in Case IV.

The hard, swollen condition of the pancreas, and especially of the head of the pancreas, led me to believe during the operation that a malignant tumor existed, which had caused the biliary obstruction, and this so much the more as I was unable to detect the small stone in the diverticulum of Vater. The autopsy demonstrated that the stone was present, and that no tumor of the pancreas existed; consequently the swelling or enlargement of the pancreas, which I felt during the operation, must have been of an inflammatory nature. This is in conformity with the considerable inflammatory swelling of the lymph-gland, the size of a small walnut, in the hepatico-duodenal ligament, on the anterior surface of the common duct. Although I had in other cases found swellings of the lymph-glands in this location, as a symptom of the inflammation which probably caused the adhesion between the biliary tract from the gall-bladder to the end of the common duct, on the one hand, and all the movable adjacent organs—the omentum, stomach, transverse colon, abdominal wall, and duodenum—on the other, I had not before observed any marked inflammatory swelling of the pancreas.

Similar observations have recently been reported by Riedel in a communication made before the Section of Surgery of the Convention of Naturalists in Lubeck on September 19, 1895. Riedel found inflammatory changes in the pancreas following gall-stone disease, which caused so considerable a swelling as to give the impression of a large pancreatic tumor. The author mentioned two cases in which these apparent tumors disappeared entirely, and a third case in which the autopsy demonstrated the simple inflammatory character of the tumefaction.

CASE VI. *Tuberculosis of knee and shoulder for which resections were made; last operation three years ago; two years ago, pain in epigastric region; May, 1895, pain over liver; July, 1895, pain in epigastric region, with icterus; August, 1895, third attack, medium degree of icterus, emacia-*

*tion; loss of weight, 53 pounds in seven months; no tumor in region of gall-bladder; choledochotomy; two large stones and one small stone removed; cholecystotomy; one stone removed; recovery; gained 38 pounds in two months.*

Miss A. E. D., aged twenty-four years, was admitted to Passavant Memorial Hospital, October 5, 1895. Family history negative. Patient had the ordinary diseases of childhood; she began to menstruate at the age of sixteen years, and has always been regular. She was reared at the breast, and has never used cow's milk to any extent.

In 1887 I operated upon her first, making a resection of the right knee-joint on account of tuberculosis. A second operation was performed six months later. Six months after this I operated upon her for tuberculosis of the right shoulder-joint, and since that time I have twice operated upon the right shoulder, the last operation being performed three years ago.

Her present illness began in 1893, when she had severe epigastric pain of a dull, aching character. The pain persisted for about a week, but she remained in bed for a week after this. The pain was accompanied by vomiting-attacks, which recurred twice a day. The patient thinks that she was given emetics, for the vomiting attacks always gave relief, which continued until she took solid food, when the pain would recur, to be relieved by another attack of vomiting. During the second week of this illness she had no attacks of vomiting. At this time she had no trouble with her bowels, and was not jaundiced, although she thinks her skin was a little darker than usual after the attack. During the last two years she has had slight attacks of pain, which were usually followed by slight darkening of the skin.

In May, 1895, she had a severe attack, which began suddenly, with dull pain, increased on deep respiration, in the right side, in the region of the costal arch, over the liver. This pain continued until the latter part of June, but was not attended by vomiting. The pain then grew worse, and became so severe that on July 1st she was obliged to take to her bed. Two days later the attacks of vomiting recurred. She vomited continually for two weeks upon the slightest provocation, even the ingestion of a few drops of water would cause an attack. At this time vomiting gave no relief from the pain. The pain had now extended until the epigastric, hypochondriac, and lumbar regions were included, and these parts were sore and tender to the touch.

On July 6th she had jaundice for the first time, and this has persisted up to the present time. She improved slightly, so that she was able to be up and around about July 20th; but on August 5th she had a third and very severe attack, localized in the epigastric region, but without pain in the sides, except at the maximum of the attack. Forced vomiting gave her immediate relief, and up to this time she always nauseates herself before she vomits. This third attack lasted for about two weeks. Since that time she has had occasional pain, but no continued attack. Solid food always causes or increases the pain. During the attacks there is great tenderness in the epigastrium, but this tenderness disappears with the pain.

There has been a marked diminution of weight. In February, 1895, she weighed 133 pounds; in October, seven months later, she weighed only 80 pounds, a loss of weight of 53 pounds.

Upon examination the patient was found to be very thin, her eyes



surrounded by dark circles; the skin was a dark greenish-yellow, but not distinctly icteric. On account of her previous history and this bronzing of the skin I thought of Addison's disease, tuberculosis of the suprarenal capsules. The thoracic organs were normal, the abdomen flat, liver-dulness normal, no tumor in the region of the gall-bladder. The borders of the liver could not be distinctly felt. There was no tumor in the epigastrium, and the aorta appeared normal. There was slight tenderness upon deep pressure in the median line midway between the xiphoid appendix and the umbilicus, but it was indistinct, and no swelling or resistance could be felt. Dr. Conley states that the patient says she has passed many gall-stones.

*Operation.* On October 8th, assisted by Dr. Waters, who administered the ether, Drs. Brougham and Brown, and in the presence of Dr. Conley, I made a longitudinal incision an inch and a half to the left of the linea alba in the outer third of the rectus abdominis muscle. The peritoneum was stitched to the skin from the border of the ribs to the umbilicus, and later on to one inch below this point. A flat sponge was inserted to push back the omentum. Exploration revealed the border of the liver and the end of the gall-bladder, the latter appearing as a whitish, empty, folded sac, the end of which protruded like the end of a finger. It was  $1\frac{1}{2}$  cm. in diameter, and firm to pressure, as if it were contracted around a small stone. This led me to believe that the lumen of the gall-bladder was obliterated behind a stone lodged in its distal end. The finger could be easily passed down to the neck of the gall-bladder and the cystic duct, and from here into the foramen of Winslow. The hepatico-duodenal ligament was palpated between the index-finger and thumb and two floating stones felt therein, which could be easily moved from the hilus down to the posterior surface of the duodenum.

The abdominal incision was prolonged to one inch below the umbilicus, making the incision in all 12 or 14 cm. in length, in order to gain operating-space without the necessity of making a transverse incision. The sponge over the stomach was held to the left by the fingers of an assistant, the liver held up by the fingers of another assistant, and I had my left index-finger in the foramen of Winslow. The tip of the finger could be seen through the hepatico-gastric ligament, above the hepatic artery which could be seen and its pulsations felt. One of the two stones was pressed against the anterior wall of the hepatico-duodenal ligament, whereupon I saw a blue strip or line above the stone, which I feared was the vena porta; but upon releasing the pressure I saw a branch passing downward from this vein, and therefore judged the blue line to be a branch of the vena porta dividing in the loose layer of the hepatico-duodenal ligament on the anterior wall of the left half of the dilated ductus choledochus. I now incised the duct over the stone below the upper horizontal branch and to the left of the descending branch, being guided by the stone, which showed through the wall of the duct, or rather gave the wall of the duct a whitish appearance. No enlarged lymph-glands were found. When the stone was reached, clear yellow bile escaped. The first stone was then squeezed out and the second stone brought into view and pushed out. I then easily inserted my little finger into the ductus choledochus for a distance of 2 inches, behind the duodenum, where I felt a small stone, and up into the hilus of the liver, where I could feel no stones. By

manipulation with the left third finger in the duodenal half of the duct and the right index-finger and thumb on the duodenum and head of the pancreas I could push the small stone out on the end of the left third finger. I then attempted to bring the stone out into the incision in the common duct, but it would always slide off the finger. I then introduced a small sharp spoon-curette, but could not extract the stone with it. Finally, with the left third finger in the duct, and the sharp spoon, I brought the stone out into the wound, where it broke into small pieces, which were removed in the form of *débris*.

A flexible bougie, No. 13, French, was now passed through the common duct into the duodenum, and another bougie up into the liver. A flexible silver probe passed down through the duct to the duodenum did not pass into the duodenum, but no stones could be felt; and when the probe was passed up into the liver no stones could be felt.

The incision in the common duct was closed by five or six silk mucosa sutures and a continuous suture through the wound in the anterior layer of the hepatico-duodenal ligament. Notwithstanding the introduction of additional sutures, bile still oozed out. The field of operation in the common duct was now cleansed and packed with sterilized gauze. As the stone in the end of the gall-bladder was immovable, I now incised the wall of the gall-bladder over it. The wall was thick and considerable hemorrhage followed the incision. The stone, which lay in a bed of mucosa which enclosed it snugly, was now removed, but broke into *débris* during this process. I introduced my little finger into the gall-bladder and found it empty, but so contracted as only just to permit my finger, 14 mm. in diameter, to pass down to the cystic duct, where no stone was felt.

A drainage-tube was now inserted into the gall-bladder and gauze packed in over the wound in the common duct, up between the liver and stomach, and above and below the drainage-tube, which was passed down to the incision in the ductus choledochus. The gall-bladder wound was now united to the upper end of the external wound, the lower part of which was closed. The union of the wound was then completed with the exception of the opening for drainage-tubes and gauze-packing in the wound over the common duct.

The operation lasted an hour and a half. At its close the patient was in good condition with strong pulse. The operation was easy, as there were no adhesions. I feared tuberculosis, but found the peritoneum normal and no enlarged glands in the hilus of the liver. I also feared collapse from the cholemia, but the patient bore the operation well, and five hours afterward was in good condition; pulse 80, strong; no vomiting; and was anxious to see the stones which had been removed.

*October 9th.* The patient had a fairly good night; no vomiting. The dressings were removed and found to be soaked with bile coming mostly from the large tube leading to the common duct. She vomited three times during the day a small quantity of bile, and on the day following vomited considerable quantities of bile. *11th.* She vomited several times very small quantities of bile. *12th.* Wound was dressed, found to be perfectly clean; no bile was found in the dressings, but only a serous, odorless discharge. *13th.* A portion of the gauze-drain in the gall-bladder and of that passed down to the common duct was removed. The icterus appeared to be less, and the patient's general condition was much improved. *17th.* All the gauze was removed from the gall-

bladder wound; patient was continuously improving. 19th. The remainder of the gauze-drain and also the drainage-tubes were removed. No bile in the dressings. 21st. Stitches removed, wound in good condition, and the discharge materially decreased.

*December 17th.* Wound healed and patient left hospital. She has gained thirty-eight pounds in weight, looks well, feels well, has a splendid appetite, and feels no pain.

(To be continued.)

## NIGHT-TERRORS (PAVOR NOCTURNUS).

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UP to the present time the above subject has received but scant attention at the hands of English writers on medicine. In the works of Bristowe<sup>1</sup> and Gowers<sup>2</sup> I can find no description of it. Hilton Fagge,<sup>3</sup> in his excellent treatise, dismisses the subject with about half a dozen lines. In fact, in no one of the books on general medicine or nervous diseases can I find any account of the complaint that is to me at all commensurate with interest and possible importance attaching to it. Of course, as might be expected, in the works of the special writers on children's diseases the subject receives more attention; but even here, I think, exception may be taken to the insufficient manner in which it is discussed by most. Thus, in the justly esteemed work of Eustace Smith,<sup>4</sup> night-terrors are stated to be, in his belief, solely the result of indigestion, and therefore considered as not requiring detailed notice. Donkin<sup>5</sup> does not dwell at any length on the subject, though he evidently considers that night-terrors indicate nervous disorders. Goodhart,<sup>6</sup> although he seemingly deems the complaint of importance, and gives excellent advice regarding it, only affords about half a page to its consideration. In the exceedingly able work of Ashby and Wright<sup>7</sup> I cannot find it even mentioned. In the works of West<sup>8</sup> and Angel Money<sup>9</sup> the subject is treated at some length, but the descriptions given of it are, in my opinion, unsatisfactory, and are undoubtedly contradictory in their teaching.

In France more attention has been paid to the subject, and valuable contributions to it are to be found in the writings of Bouchut,<sup>10</sup> Moizard,<sup>11</sup> and others.

For German authorities night-terrors would seem to afford considerable attraction, and since Hesse<sup>12</sup> wrote about them in 1845, more or less exhaustive accounts of them have followed from the pens of many. Chief among such writers may be mentioned Henoeh,<sup>13</sup> Soltmann,<sup>14</sup> Steiner,<sup>15</sup> Silbermann,<sup>16</sup> and Niemeyer.<sup>17</sup> It is true that most of these



have differed widely in their interpretation of what constitutes night-terrors and the import they place upon them, but this in no wise diminishes the value of their contributions to the subject.

If not so numerous as the German, the American additions to the literature of the complaint are nevertheless of extreme value. For a proof of this I need only to refer to the writings of Lyman<sup>18</sup> and H. C. Wood.<sup>19</sup> In an exceedingly able article, too, Dr. C. P. Putnam<sup>20</sup> gives a description of the complaint and a valuable summary of the opinions regarding it. I am not at one with him as to the conclusions he draws as to its nature, but I willingly admit my indebtedness to him for many references which I might possibly have otherwise missed.

Satisfactory or unsatisfactory as the writings on night-terrors of the authors of these different nationalities may be, there is one fact concerning them that must strike the most cursory reader. This is the extreme divergence of opinion among them as to the nature and importance of the complaint, and at first sight it would seem a hopeless task to attempt to reconcile them. My colleague, Eustace Smith, for instance, in his work on *Children's Diseases*, ascribes night-terrors to digestive troubles, but of late, I believe, he considers adenoids and other nasopharyngeal disorders as potent factors in their causation. Warrington Haward<sup>21</sup> attributes them to enlarged tonsils. Ringer<sup>22</sup> considers them as arising from indigestion. West agrees with this, although he says he has known serious brain-trouble arising from them. Goodhart thinks them allied to somnambulism and nocturnal incontinence. Moizard, Bouchut, Heise, Soltmann, Silbermann, H. C. Wood, and others link them with epilepsy. Angel Money, too, calls them a form of cortical epilepsy. Donkin mentions them among the emotional and other nerve disturbances which are common in rheumatic children. He states that night-terrors, especially when frequent and accompanied by hallucinations, are often coexistent with and indicative of epilepsy; and further says, in his chapter on "Hysteria," that night-terrors, with or without definite hallucinations described by the patient, are very common in hysterical children, but that they also occur occasionally in almost any child as the result of undue excitement and various kinds of nervous disturbance. Henoeh says he has seldom seen them in connection with either hysteria or epilepsy. In fact, it would be hard to find any single complaint about which there is so much discussion among authorities as night-terrors. This was well emphasized in a discussion on an interesting paper on the subject by Dr. W. S. Colman,<sup>23</sup> at which I was present. Here no speaker seemed to agree with his predecessor as to their importance or causation.

All these conflicting opinions as to the causation of night-terrors may be summed up, it seems to me, under two comprehensive groups. In the first group may be classed the opinions that the complaint is reflex

in its origin or due to partial asphyxia owing to abdominal disturbance, naso-pharyngeal trouble, or ill-ventilation of the sleeping-apartment. In the second group may be classed the views that night-terrors are central in origin and manifestations of present brain-disturbance, and the harbingers of possible further neuroses in the near or distant future.

Keeping these two sets of opinions under consideration, I think it can be shown that the holders of them have arrived at their widely differing views of the causation and importance of night-terrors from a confusion between conditions that manifest themselves by symptoms that, at first sight, bear a close resemblance to each other. Closer examination, however, should, I consider, reveal the fact that the only thing really common to these two sets of conditions, which are widely different in their gravity, is the occurrence of fright in the early hours of the night. For this confusion I fancy the name "night-terrors" is largely or wholly responsible. Just as in the case of anterior poliomyelitis the name of "infantile paralysis" has led to numerous cases of hemiplegia and other infantile motor troubles being grouped under its denomination, so with night-terrors the name has led to complaints with nothing in common except the presence of a night-time panic being classified in the same category. Now there are, in my experience, two totally different classes of cases with the common symptom of terror arising during sleep. In the first class come cases which are fairly frequent and of little import, where the terror is reflex and due to abdominal or nasal trouble. In the second class come cases of comparative infrequency, where the malady arises from central cerebral disturbance, and is to be regarded with gravity as to both the present and the future of the patient. For the first class of cases, where the complaint is of reflex origin, I would suggest the familiar name of "nightmare," reserving that of "night-terrors" for the second class, where the malady is central in origin. Such an appropriation of names is, of course, purely arbitrary, and the two might be interchanged with equal propriety; but the name "night-terrors" has now gained a firm footing in medical nomenclature, and it seems to me fitting to reserve it for the class of cases that alone deserve a separate name and description. There is authority, too, for this naming a complaint after its most prominent symptom, in the retention of such titles as infantile paralysis in classes of cases with definite and sure pathological bases. Beyond doubt a better title could be given to the malady than the one in vogue, but names once given are hard to displace. For the selection of that of "nightmare" in the commoner and less important complaint, I feel justified in that it is the one generally bestowed on the symptom by the public at large.

This division of the subject that I propose has already, I fancy, been done by Silbermann. That author's classification of night-terrors into those that are "idiopathic" and others that are symptomatic in origin

would seem to correspond with my own, if I read him aright. Here his "idiopathic" class corresponds with my "night-terrors," his "symptomatic" one with my "nightmare."

As a cardinal point of distinction between the two complaints, I would insist that in night-terrors it is essential that the little patient should "see visions;" in nightmare it is sufficient that he merely "dream dreams." There are many other points of distinction, but, in attempting a discrimination between them, the last mentioned is a fundamental one. Unfortunately, it is but seldom an opportunity is afforded one of personally witnessing an attack, and an opinion has to be formed on the evidence, more or less untrustworthy, furnished by the relatives or friends. Nevertheless, attention to the following details generally leads one to a correct conclusion as to with which of the two complaints one has to deal.

Night-terrors seldom occur in children under the age of two or above that of eight years. Nearly all writers who attach any gravity to the complaint bearing this name are agreed on this. In nightmare there are no such limits of age, and many of us are personally acquainted with the states of panic arising from troubled dreams in adult age.

In a large percentage of cases of night-terrors there is a history of neuroses, such as epilepsy, hysteria, chorea, etc., in the other members of the family. There is no such neurotic family history in the vast majority of cases of nightmare, although it is common enough for more than one member of a family to suffer from it and adenoids at the same time.

Infantile convulsions, in my experience, are far from infrequent precursors of night-terrors in later age. There is no such relation between convulsions and subsequent nightmare that I have been able to discover.

In night-terror the attack generally comes on when the child is in the best of health, is quite sudden in its onset, and there is no indication afforded by which its advent is to be predicted. The children who suffer from nightmare are often the subjects of chronic ill-health from digestive disturbance or nasal troubles, and the attack is often merely the temporary termination of a sleep that, as Silbermann has pointed out, has been an uneasy one from the beginning. In the course of a night there is usually but a single attack of night-terrors, although there may be several of nightmare.

Turning from these preliminaries to the actual attack it is essential, as I have stated before, that the subject of night-terrors should see visions. The nature of these visionary hallucinations is one of interest, and generally presents several features of significance and importance. To illustrate this I will endeavor to describe briefly the usual sequence of events in a typical attack.



The first thing that calls attention to the child is almost invariably a sudden, agonizing scream of terror. On entering the room he is found, seemingly wide awake, sitting up in bed or crouching in a corner. With flushed face, and in a state of wild excitement, he converses with, or vehemently protests against, some imaginary person or thing that he sees close to him. The vision is always something of a threatening or terrifying nature, such as a horrible negro, a black statue, and the like. I have been much struck, too, with the large part the color red plays in these hallucinations, and Gowers has pointed out the same fact in the visual auras of epilepsy, and soldiers, blood, and fire figure prominently in the accounts furnished to me by parents. Whatever be the nature of the vision, it is repeated again and again in exactly the same features in each attack, even after the passage of months in the interval between them. Although seemingly wide awake in the attack, the child cannot be made sensible of his surroundings, and generally after being laid down goes off into a deep sleep without recognizing those about him. In the morning he has usually no recollection of what occurred during his sleep. Care has to be exercised in ascertaining this point, as children are apt to appropriate as their own experience occurrences that are often talked of before them, and are ready to detail them with parrot-like precision when questioned.

It is not, of course, essential that all these characteristics should be present before determining as to whether a given attack was one of night-terrors or not. I have, however, thought it well to give in detail the lines that are useful for guidance in this direction.

Contrasting nightmare with night-terrors, I think important differences are not hard to find. In the former the sleep is often disturbed from the outset, and the attack is merely a culmination of the state of unrest. On going to the child on his crying out, he is found wide awake, and not merely seemingly so. He generally complains of some vague terror, the result of his awaking alone in the dark. If he complain of persons or things being in the room, it will be found that his fancies are merely the remnants of a troubled dream, and he does not see them in the presence of a light. The objects of apprehension, too, are generally such as he has come across in his waking moments. It is perfectly common for a child that has been terrified by a person or some animal in the daytime to have such terrors repeated in his dreams at night. In contradistinction to night-terrors, the same objects of dread are not presented with unchanging fidelity, but may vary with each separate attack. Although the child may be almost demented from extreme terror, and it may take some time to soothe him from it, yet he is from the first aware of the presence of those in the room with him. When his fears are allayed, he so dreads the return of them that hours of wakefulness may be the result of the attack. In the morning he has usually a perfect recollection of the occurrences of the night.

Such are briefly the lines of contrast between two distinct complaints that I believe have been too often confounded. The one, "nightmare," is of common occurrence and of little moment in itself, but often associated with chronic ill-health in its subject. The other, "night-terrors," is rare and of gravity with regard to neuroses in the future.

The similarity of the phenomena presented in what I have described as a typical attack of "night-terrors" to those that take place in one of the well-recognized forms of epilepsy is not to be gainsaid. The recurrence of the same hallucinations, even after long intervals of time, the nature of the visions, the non-recognition of surroundings, and the non-recollection of what has been gone through, are features common to both. Dr. Hilton Fagge, who groups night-terrors with epilepsy, indeed suggests the name of "daymare" for the form of epilepsy in question. Considerations such as these should merely engender caution in a venture on the prognosis as to the future of a patient with night-terrors. Dr. Angel Money, indeed, unhesitatingly calls these last a form of "cortical epilepsy." On the other hand, Dr. W. S. Colman only considers them as an epileptic manifestation when the attacks are continued on into adult life—a contingency that is not within my experience—although Dr. Coleman has known more than one instance of it. Dr. H. C. Wood says "Night-terrors are not rarely the precursors of epilepsy." Soltmann, too, writes that they are observed to pass into epilepsy, and that there are cases in which it is impossible to say whether a given attack is one of night-terrors or epilepsy. Moizard quotes several cases where epilepsy followed night-terrors. Lyman says "Insanity, hysteria, neurasthenia, epilepsy, chorea, and nervous dyspepsia are often discovered among their near relatives." My own experience fully tallies with that of the authors just quoted. I have known more than one case where epilepsy followed upon night-terrors, and I can hardly recall a case where there was not a pronounced neurotic taint in the family history of the sufferer from them. Dr. Charles Putnam, however, is inclined to think too much stress has been laid upon the connection between night-terrors and epilepsy. It is quite true, as he remarks, that the published cases where the one has followed the other are few in number. This possibly arises from the fact that those who have recognized the gravity of night-terrors may have had but seldom the opportunity of following up the after-history of their patients. As a proof of this I would mention that in several cases brought to me for epilepsy I have been able to verify the former existence of night-terrors. This was only brought out by inquiry, as the last complaint was deemed of so little moment that the mothers did not consider it worthy of mention in the previous histories. I have no reason either to think that my experience in this matter would be at variance with that of others with large numbers of cases of epilepsy in children to deal with, if such inquiries were considered worthy of being made.

Epilepsy is not, however, the only, and perhaps not even the most frequent, sequel to night-terrors in children. An attack of the last is only the loud proclaimant of the neurotic temperament in its subject, and there is no doubt that other neuroses, such as hysteria, chorea, migraine, insanity, somnambulism, and the like, play a large part in the after-histories as well as epilepsy. Somnambulism and somniloquence, indeed, are very close and frequent attendants on the complaint, and have been often noted in cases where epilepsy has eventually followed.

The treatment of night-terrors calls for but few remarks. When the attacks are frequent and they cause distress to the relatives, I agree with the common practice of giving appropriate doses of bromide of potash. By this means, and more especially when the drug is given in the evening, the attacks can be largely held under control. If, however, the attacks are infrequent, and there is no other indication for the administration of bromide, I consider a prolonged course of the last inadvisable and possibly harmful. With the following words of Dr. Goodhart I heartily concur: "It (night-terrors) is a malady of little detriment in itself; but as an indication of a nervous organization it is most valuable. It is the 'slacken speed' to the engine-driver which must never pass unheeded. It is one of the smaller ailments I am always most careful to inquire for and to treat, for it is my belief that by so doing it may be possible to avert some one or other of the graver nervous maladies so common in later life."

Strict attention to the child's surroundings and a careful supervision of its training to obviate as far as possible any undue mental or nervous stress in reality constitute the essentials of treatment in night-terrors.

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# THE INFLUENCE OF ALCOHOL AND ALCOHOLIC DRINKS UPON THE CHEMICAL PROCESSES OF DIGESTION.<sup>1</sup>

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(Continued from p. 59.)

## ACTION OF WINES.

IN considering the action of wines on gastric digestion it is to be remembered that we have to deal with a class of beverages which naturally contain far less alcohol than the liquors already discussed. The prominence which they have as accessories to food, however, and the relatively larger quantities in which they are consumed lend special importance from a physiological standpoint to a study of their action. Further, the greater complexity of wines in chemical composition naturally introduces a variety of factors, aside from the alcohol, which necessarily merit some consideration. It is likewise to be remembered that while wines are supposed to consist simply of pure grape-juice fermented and clarified, there is a large manufacture of artificial wines, both in Europe and in this country, in which "raisins, cider, sugar, alcohol, glycerin, tartaric acid, cream of tartar, coloring-matter, wine-flavors, and water" are the principal substances used.<sup>1</sup>

With special reference to the content of alcohol we may divide wines into the two classes of heavy and light—*i. e.*, those which contain a comparatively large percentage of alcohol, as sherry and port, and those which contain a smaller amount of alcohol, such as clarets and hocks. With reference to the many grades of California wines which are being so widely used at present in this country, we may refer to a recent report on their chemical composition and characteristics by Dr. King.<sup>2</sup>

### *Sherry.*

Our experiments were commenced with a brand of sherry sold as "Amontillado Sherry," at 75 cents per quart. Its composition was found to be as follows:

|                                  |                           |
|----------------------------------|---------------------------|
| Specific gravity . . . . .       | 0.997 (at 17.5° C.).      |
| Alcohol by volume . . . . .      | 20.75–21.75 per cent.     |
| Solid residue at 110° C. . . . . | 4.7338 grams per 100 c.c. |
| Ash . . . . .                    | 0.4154 gram " "           |
| Reaction acid.                   |                           |

<sup>1</sup> See report by Dr. Englehardt in the Second Annual Report of the State Board of Health of New York, p. 619.

<sup>2</sup> "Some Characteristics of California Wines," by W. H. King, of the Chemical Laboratory of the U. S. Department of Agriculture. *Journal of Amer. Chem. Soc.*, vol. xvi. p. 597.

*Experiment 49.*

Conditions:

Proteid = cooked beef proteids<sup>1</sup> (10 grams).

10 grams beef contain 4.3262 grams dry proteid.

0.016 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $7\frac{1}{2}$  hours at 38°–40° C.

| Sherry.     | Undigested<br>beef. | Proteid<br>digested. | Relative proteolytic<br>action. |
|-------------|---------------------|----------------------|---------------------------------|
| 0 per cent. | 1.9810 grams.       | 54.3 per cent.       | 100.0                           |
| 1 "         | 2.0839 "            | 51.9 "               | 95.5                            |
| 3 "         | 2.0995 "            | 51.5 "               | 94.8                            |
| 6 "         | 2.1102 "            | 51.3 "               | 94.4                            |

*Experiment 50.*

Conditions:

Proteid = blood-fibrin (2 grams).

0.016 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $2\frac{3}{4}$  hours at 38°–40° C.

| Sherry.     | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|-------------|-----------------------|----------------------|---------------------------------|
| 0 per cent. | 0.3646 gram.          | 81.8 per cent.       | 100.0                           |
| 1 "         | 0.3555 "              | 82.3 "               | 100.6                           |
| 3 "         | 0.4075 "              | 79.7 "               | 97.4                            |
| 6 "         | 0.4213 "              | 79.0 "               | 96.5                            |

*Experiment 51.*

Conditions:

Proteid = fluid egg-albumin (15 c.c.).

15 c.c. albumin solution contain 1.0522 grams dry albumin.

0.0024 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $5\frac{3}{4}$  hours at 38°–40° C.

| Sherry.                      | Undigested<br>albumin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|------------------------------|------------------------|----------------------|---------------------------------|
| 0 per cent.                  | 0.4547 gram.           | 56.8 per cent.       | 100.0                           |
| 1 "                          | 0.5072 "               | 51.8 "               | 91.1                            |
| 3 "                          | 0.5101 "               | 51.6 "               | 90.8                            |
| 5 "                          | 0.5806 "               | 44.9 "               | 79.0                            |
| 7 "                          | 0.5916 "               | 43.8 "               | 77.1                            |
| Sherry residue. <sup>2</sup> |                        |                      |                                 |
| 1 per cent.                  | 0.4912 "               | 53.4 "               | 94.0                            |
| 7 "                          | 0.5482 "               | 47.9 "               | 84.3                            |

*Experiment 52.*

Conditions:

Proteid = fluid egg-albumin (15 c.c.).

15 c.c. albumin solution contain 1.1948 grams dry albumin.

0.0024 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $5\frac{7}{12}$  hours at 38°–40° C.<sup>1</sup> Washed free from all soluble matters and freed from fat.<sup>2</sup> The residue left on evaporation of the sherry. This was then dissolved in water and introduced into the digestive mixtures, the percentages referred to being the amount of residue contained in 1 per cent. and 7 per cent. of the original sherry, respectively.

| Sherry.         | Undigested albumin. | Proteid digested. | Relative proteolytic action. |
|-----------------|---------------------|-------------------|------------------------------|
| 0 per cent.     | 0.6503 gram.        | 45.6 per cent.    | 100.0                        |
| 1    "          | 0.6578   "          | 45.0   "          | 98.6                         |
| 3    "          | 0.6930   "          | 42.0   "          | 92.1                         |
| 6    "          | 0.7533   "          | 37.0   "          | 81.1                         |
| Sherry residue. |                     |                   |                              |
| 1 per cent.     | 0.6728   "          | 43.7   "          | 95.8                         |
| 6    "          | 0.6560   "          | 45.1   "          | 98.9                         |

*Experiment 53.*

The conditions were the same as in the preceding experiment, excepting that the period of digestion was  $6\frac{5}{12}$  hours.

| Sherry.         | Undigested albumin. | Proteid digested. | Relative proteolytic action. |
|-----------------|---------------------|-------------------|------------------------------|
| 0 per cent.     | 0.6617 gram.        | 44.7 per cent.    | 100.0                        |
| 1    "          | 0.6864   "          | 42.6   "          | 95.3                         |
| 3    "          | 0.7304   "          | 38.9   "          | 87.0                         |
| 6    "          | 0.7368   "          | 38.4   "          | 85.9                         |
| Sherry residue. |                     |                   |                              |
| 1 per cent.     | 0.6839   "          | 42.8   "          | 95.7                         |
| 3    "          | 0.6810   "          | 43.1   "          | 96.4                         |
| 6    "          | 0.6314   "          | 47.2   "          | 105.5                        |

*Experiment 54.*

Conditions:

Proteid = blood-fibrin (2 grams).

0.016 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $2\frac{1}{2}$  hours at  $38^{\circ}$ – $40^{\circ}$  C.

| Fluid added.             | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|--------------------------|--------------------|-------------------|------------------------------|
| 0 per cent.              | 0.2013 gram.       | 90.0 per cent.    | 100.0                        |
| 5    "   absol. alcohol. | 0.2601   "         | 87.0   "          | 96.6                         |
| 5    "   sherry          | 0.3401   "         | 84.8   "          | 94.2                         |

From these results it is plain that while sherry wine has a marked retarding effect on gastric digestion—an effect which increases with the weakness of the gastric juice—the inhibitory action is out of all proportion to the amount of contained alcohol. Thus, 10 per cent. of the sherry used in these experiments would be equivalent simply to 2 per cent. of absolute alcohol, an amount which, as we have seen, is wholly inadequate to bring about the retardation in proteolysis observed with sherry. Indeed, 2 per cent. of alcohol is more liable to be without any marked influence on pepsin-proteolysis. The presence of 5 per cent. of sherry, however, as our last experiment shows, has a far greater retarding effect than even 5 per cent. of absolute alcohol. It is thus evident that we must look elsewhere for an explanation of the action of sherry wine on gastric digestion. Buchner,<sup>1</sup> in his investigations of the

<sup>1</sup> Deutsches Archiv f. klin. Med., Band 29, p. 537.



influence of alcoholic liquors on peptic digestion, found that the light white and red French wines retarded digestion far more than corresponding quantities of alcohol. Similar results were obtained with the stronger Hungarian wines (Ruster and Tokayer). Especially unfavorable was the action of Marsala wine. Buchner attributed these results to the presence of the "*bouquet stoffe*." It is evident, however, from our results that with sherry regard must be had to the residue or solid matter contained in the wine. This, as our analysis shows, is present in the wine to the extent of approximately 4.75 per cent., the greater proportion of which is organic matter. Further, it is evident that this solid matter, when free from the alcohol of the wine, has by itself a distinct influence on peptic digestion. So far as our experiments show, small amounts of this solid matter retard peptic digestion more than larger quantities. Indeed, in one case the solid matter equivalent to 6 per cent. of sherry increased the digestive action of the artificial gastric juice quite appreciably. Evidently there are various factors of unknown nature in this residue which exert an influence, not always constant, upon the rate of digestive proteolysis by pepsin-hydrochloric acid.

The following experiments throw some additional light upon this subject:

*Experiment 55.*

Conditions:

Proteid = blood-fibrin (2 grams).

0.016 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $2\frac{1}{2}$  hours at  $38^{\circ}$ – $40^{\circ}$  C.

| Fluid added.      | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------------|--------------------|-------------------|------------------------------|
| 0 per cent.       | 0.2027 gram.       | 89.9 per cent.    | 100.0                        |
| 5 " sherry        | 0.2340 "           | 88.3 "            | 98.2                         |
| 5 " " residue     | 0.2627 "           | 86.9 "            | 96.6                         |
| 5 " absol. alcoh. | 0.2619 "           | 87.0 "            | 96.7                         |

*Experiment 56.*

Conditions the same as in the preceding experiment, except that the mixtures were warmed at  $38^{\circ}$ – $40^{\circ}$  C. for  $1\frac{7}{12}$  hours.

| Fluid added.                   | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|--------------------------------|--------------------|-------------------|------------------------------|
| 0 per cent.                    | 0.3247 gram.       | 83.8 per cent.    | 100.0                        |
| 5 " absol. alcoh.              | 0.3554 "           | 82.3 "            | 98.2                         |
| 10 " sherry                    | 0.4785 "           | 76.1 "            | 90.8                         |
| 10 " " distillate <sup>1</sup> | 0.2855 "           | 85.8 "            | 102.3                        |
| 10 " " residue                 | 0.4453 "           | 77.8 "            | 92.8                         |

<sup>1</sup> Being the distillate from this amount of sherry and containing obviously all of the alcohol together with the other volatile substances present therein.

It is thus evident that so far as the alcohol and other volatile substances present in sherry are concerned, the amount introduced into an artificial gastric juice with 10 per cent. of sherry (*i. e.*, 10 c.c.) tends to increase quite distinctly the rate of digestion. Hence, the substance or substances which give the bouquet to this wine are probably not the cause of the retardation in digestive action, but this is to be traced directly and solely to the substance or substances which make up the solid matter of the wine. Obviously, however, if sherry be mixed with gastric juice in such quantity as to introduce 5, 10, or 15 per cent. of absolute alcohol the latter will produce its ordinary retardation of proteolytic action, although doubtless lessened somewhat by the bouquet or other volatile material which apparently stimulates rather than retards peptic digestion.

Our results are thus more or less in accord with the results obtained by Sir William Roberts,<sup>1</sup> who in writing of the effects of sherry and port on gastric digestion says, "It is evident that the retarding effects of sherry and port considerably exceed what is due to the alcohol contained in them. The table shows that when the digesting mixture contained 40 per cent. of either wine the action of the ferment was brought almost to a standstill. These wines are estimated to contain about 20 per cent. of absolute alcohol (or 40 per cent. of proof-spirit); therefore, 40 per cent. of these wines is only equivalent in alcoholic strength to 16 per cent. of proof-spirit—and this proportion of alcohol retards digestion only slightly. Even in the proportion of 20 per cent., sherry trebled the time in which digestion was completed. There must, therefore, be in these wines some retarding agent besides alcohol."

We may quote Dr. Roberts still further in this connection, since his statements express so clearly our own conclusions based upon the results we have obtained: "As used dietetically, sherry must figure as having frequently an important retarding effect on peptic digestion. This wine is used with dinner by some persons very freely. Half a pint of sherry is no unusual allowance, and this in a total gastric charge of two pounds amounts to about 25 per cent., which the table shows to be a highly inhibitory proportion. In the more common practice of taking two or three wineglasses of sherry with dinner, we see probably a double action—a stimulating action on the secretion of gastric juice and on the muscular contractions of the stomach, and a slight retarding effect on the speed of the chemical process, especially in its early stages. In smaller proportions—a wineglass or so—sherry would act as a pure stimulant to digestion." On the purely chemical process of gastric digestion, however, we should be inclined, from the results of our own experiments, to insist that even small amounts of sherry may exert a slight inhibitory action. As to the cause of the retarding action of sherry, Roberts con-

<sup>1</sup> Digestion and Diet: "Effect of Food Accessories on Peptic Digestion," London, 1891, p. 134.

siders it due largely to the volatile constituents of the wine other than the alcohol, while our experiments would lead us to believe that it is attributable mainly to the character of the solid matter contained therein.

### *Claret.*

Our experiments with claret were conducted solely with a California wine of ordinary grade, known as "Chateau Roland, Bordeaux," sold at 30 cents a quart. Its composition was as follows:

|                                  |                           |
|----------------------------------|---------------------------|
| Specific gravity . . . . .       | 1.000 (at 20° C.).        |
| Alcohol by volume . . . . .      | 9.75–10.0 per cent.       |
| Solid residue at 110° C. . . . . | 3.3056 grams per 100 c.c. |
| Ash . . . . .                    | 0.6336 gram " "           |
| Reaction strongly acid.          |                           |

That this was a typical sample of a California wine of the claret type, at least so far as the content of alcohol is concerned, is indicated by the fact that King<sup>1</sup> states in his paper on the "Characteristics of California Wines" that California clarets contain 9.16–11.23 per cent. of alcohol.

### *Experiment 57.*

Conditions:

Proteid = blood-fibrin (2 grams).

0.016 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $2\frac{1}{2}$  hours at 38°–40° C.

| Claret.     | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------|--------------------|-------------------|------------------------------|
| 0 per cent. | 0.3401 gram.       | 83.0 per cent.    | 100.0                        |
| 1 "         | 0.3252 "           | 83.8 "            | 100.9                        |
| 3 "         | 0.3965 "           | 80.2 "            | 96.6                         |
| 6 "         | 0.3732 "           | 81.4 "            | 98.0                         |

### *Experiment 58.*

Conditions:

Proteid = fluid egg-albumin (15 c.c.).

15 c.c. albumin solution contain 1.347 grams dry albumin.

0.04 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion 7 hours at 38°–40° C.

| Claret.                      | Undigested albumin. | Proteid digested. | Relative proteolytic action. |
|------------------------------|---------------------|-------------------|------------------------------|
| 0 per cent.                  | 0.5800 gram.        | 57.0 per cent.    | 100.0                        |
| 1 "                          | 0.5813 "            | 60.6 "            | 106.3                        |
| 3 "                          | 0.5899 "            | 56.3 "            | 98.7                         |
| 6 "                          | 0.5892 "            | 56.3 "            | 98.7                         |
| Claret residue. <sup>2</sup> |                     |                   |                              |
| 1 per cent.                  | 0.5865 "            | 56.5 "            | 99.1                         |
| 3 "                          | 0.5253 "            | 61.0 "            | 107.0                        |
| 6 "                          | 0.5903 "            | 56.2 "            | 98.5                         |

<sup>1</sup> Loc. cit.

<sup>2</sup> The residue left on evaporation of the claret. The several percentages refer to the original claret, *i. e.*, the 1 per cent. claret residue being the residue from 1 per cent. of claret.



*Experiment 59.*

Conditions :

Proteid = fluid egg-albumin (15 c.c.).

15 c.c. albumin solution contain 1.1948 grams dry albumin.

0.0024 gram pepsin ; 0.2 per cent. hydrochloric acid.

Period of digestion  $5\frac{1}{2}$  hours at 38°–40° C.

| Claret.         | Undigested albumin. | Proteid digested. | Relative proteolytic action. |
|-----------------|---------------------|-------------------|------------------------------|
| 0 per cent.     | 0.6808 gram.        | 43.2 per cent.    | 100.0                        |
| 1 “             | 0.6801 “            | 43.2 “            | 100.0                        |
| 3 “             | 0.6950 “            | 41.9 “            | 96.9                         |
| 5 “             | 0.7258 “            | 39.3 “            | 90.9                         |
| 7 “             | 0.7238 “            | 39.5 “            | 91.2                         |
| Claret residue. |                     |                   |                              |
| 1 per cent.     | 0.6546 “            | 45.3 “            | 104.8                        |
| 3 “             | 0.6785 “            | 43.3 “            | 100.2                        |
| 7 “             | 0.6847 “            | 42.7 “            | 98.8                         |

*Experiment 60.*

Conditions :

Proteid = fluid egg-albumin (15 c.c.).

15 c.c. albumin solution contain 1.347 grams dry albumin.

0.0024 gram pepsin ; 0.2 per cent. hydrochloric acid.

Period of digestion  $6\frac{1}{2}$  hours at 38°–40° C.

| Claret.         | Undigested albumin. | Proteid digested. | Relative proteolytic action. |
|-----------------|---------------------|-------------------|------------------------------|
| 0 per cent.     | 0.7659 gram.        | 43.2 per cent.    | 100.0                        |
| 1 “             | 0.7839 “            | 41.9 “            | 96.9                         |
| 3 “             | 0.7980 “            | 40.8 “            | 94.4                         |
| 6 “             | 0.8161 “            | 39.5 “            | 91.2                         |
| Claret residue. |                     |                   |                              |
| 1 per cent.     | 0.7589 “            | 43.7 “            | 101.1                        |
| 6 “             | 0.7644 “            | 43.2 “            | 100.0                        |

*Experiment 61.*

Conditions :

Proteid = blood-fibrin (2 grams).

0.016 gram pepsin ; 0.2 per cent. hydrochloric acid.

Period of digestion  $2\frac{1}{4}$  hours at 38°–40° C.

| Fluid added.        | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|---------------------|--------------------|-------------------|------------------------------|
| 0 per cent.         | 0.2013 gram.       | 90.0 per cent.    | 100.0                        |
| 5 “ absol. alcohol. | 0.2601 “           | 87.0 “            | 96.6                         |
| 5 “ claret          | 0.2560 “           | 87.2 “            | 96.8                         |

*Experiment 62.*

Conditions exactly the same as in the preceding experiment.

| Fluid added.        | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|---------------------|--------------------|-------------------|------------------------------|
| 0 per cent.         | 0.1759 gram.       | 91.3 per cent.    | 100.0                        |
| 5 “ absol. alcohol. | 0.2145 “           | 89.3 “            | 97.8                         |
| 5 “ claret residue  | 0.2214 “           | 89.0 “            | 97.4                         |

From a careful scrutiny of these results several conclusions are obvious: First, the presence of small amounts of claret, say 1 per cent., in a digestive mixture tends to increase rather than to decrease digestive action. Large amounts of claret have a distinct inhibitory action on pepsin-proteolysis, which, however, is not anywhere near so pronounced as with sherry. To be sure, the content of alcohol in the claret is only half that of the sherry, but even 6 per cent. of claret is equal to only 0.6 per cent. of absolute alcohol. Yet the retardation produced by the presence of 5 per cent. of claret is about equivalent to that caused by 5 per cent. of absolute alcohol. Consequently, the retardation in gastric digestion witnessed in the presence of the above percentages of claret is hardly to be attributed to the contained alcohol.

With the solid matter present in claret our results are not strictly concordant; thus, some of our experiments tend to show that the solid matter present in this wine has a direct stimulating effect, while in other experiments the retardation produced by the solid matter of the wine is exactly equal to that of the wine itself. We have not been able to come to any satisfactory conclusion on this point, the only plausible suggestion that we have to offer being that possibly the difficulty lies in the variable character of the coloring and other matters present in the wine. In any event, the alcohol present in this wine is answerable for its action on gastric digestion only to a very limited extent. Again, we find our results in close accord with those obtained by Roberts. Thus, this investigator states that the effect of both claret and hock is out of all proportion to the alcohol contained in them: "These wines are estimated to contain from 10 to 20 per cent. of absolute alcohol, so that, however freely they might be used dietetically, the amount of alcohol so introduced, even if they were used up to 80 per cent. of the total contents of the stomach, would scarcely produce an appreciable effect on peptic action. We must, therefore, again here recognize the presence of some other retarding agent besides alcohol.

"If we consider the copious proportions in which hock and claret are used dietetically, it becomes evident that their retarding effect on peptic digestion is often brought into play. A pint of claret or hock is a common allowance with dinner for robust eaters—and such a proportion as the table shows would not be without considerable effect. . . . On the other hand, the more sparing use of these wines, a glass or two, with dinner or luncheon would evidently not produce any appreciable retardation of peptic action, but would, like corresponding doses of sherry, act as pure stimulants. In both these instances, as in some others, it seems to be indicated that by adjusting the quantities we may elicit diverse effects. With large quantities we may obtain retardation; with small

quantities we may obtain acceleration of gastric digestion."<sup>1</sup> With these statements our results are mainly in accord.

*White Wine of the Rhenish Type.*

In our study of this kind of wine we employed a California wine sold under the name of "Hochheimer" at 35 cents per quart. Our analysis of the brand employed gave the following results:

|                                  |                           |
|----------------------------------|---------------------------|
| Specific gravity . . . . .       | 0.997 (at 17° C.).        |
| Alcohol by volume . . . . .      | 11.0 per cent.            |
| Solid residue at 110° C. . . . . | 1.8436 grams per 100 c.c. |
| Ash . . . . .                    | 0.2236 gram " "           |
| Reaction acid.                   |                           |

The wines of this type, as King states, are characterized by a content of alcohol varying from 8.45 to 11.67 per cent., and with an acidity equal to 0.50 to 0.65 per cent. of tartaric acid.

*Experiment 63.*

Conditions:

Proteid = blood-fibrin (2 grams).  
0.016 gram pepsin; 0.2 per cent. hydrochloric acid.  
Period of digestion 1½ hours at 38°-40° C.

| White wine. | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------|--------------------|-------------------|------------------------------|
| 0 per cent. | 0.2829 gram.       | 85.9 per cent.    | 100.0                        |
| 1 " "       | 0.2716 "           | 86.5 "            | 100.6                        |
| 3 " "       | 0.3122 "           | 84.4 "            | 98.2                         |
| 6 " "       | 0.3464 "           | 82.7 "            | 96.2                         |

*Experiment 64.*

Conditions same as above, but the period of digestion 2¼ hours.

| Fluid added.        | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|---------------------|--------------------|-------------------|------------------------------|
| 0 per cent.         | 0.2013 gram.       | 90.0 per cent.    | 100.0                        |
| 5 " wine            | 0.2439 "           | 87.9 "            | 97.6                         |
| 5 " absol. alcohol. | 0.2601 "           | 87.0 "            | 96.6                         |

*Experiment 65.*

Conditions the same as in the preceding experiment.

| Fluid added.        | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|---------------------|--------------------|-------------------|------------------------------|
| 0 per cent.         | 0.1759 gram.       | 91.3 per cent.    | 100.0                        |
| 5 " absol. alcohol. | 0.2145 "           | 89.3 "            | 97.8                         |
| 5 " wine residue    | 0.2158 "           | 89.3 "            | 97.8                         |

<sup>1</sup> Roberts: Digestion and Diet, p. 136.



*Experiment 66.*

Conditions same as above, but the period of digestion  $1\frac{3}{4}$  hours.

|    | Fluid<br>added.             | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|----|-----------------------------|-----------------------|----------------------|---------------------------------|
| 0  | per cent.                   | 0.2032 gram.          | 89.9 per cent.       | 100.0                           |
| 5  | " absol. alcoh.             | 0.2317 "              | 88.5 "               | 98.4                            |
| 10 | " wine                      | 0.2531 "              | 87.4 "               | 97.2                            |
| 10 | " " distillate <sup>1</sup> | 0.2063 "              | 89.7 "               | 99.7                            |
| 10 | " " residue                 | 0.2810 "              | 86.0 "               | 95.6                            |

From these results it is obvious that essentially the same conclusions can be drawn with regard to this white wine as have been applied to claret. A small quantity, such as 1 per cent., has no retarding action on pepsin-proteolysis, but tends rather to increase the rate of digestion. Larger amounts of the wine, say 10 per cent., have a small retarding effect, which is due almost wholly to the solid matter present in the wine rather than to the alcohol or other volatile matter. Thus, the distillate (Experiment 66) corresponding to 10 per cent. of the original wine had almost no retarding action on gastric digestion, while the residue from the same amount of wine caused a retardation even greater than that produced by the wine itself. At the same time, it is to be noticed that the white wine is far less active in retarding pepsin-proteolysis than the red wine. This difference in intensity of action depends probably upon the character of the solid matter present in the wine, or possibly upon the amount of such matter; the claret containing 3.3056 grams of solid matter per 100 c.c., while the white wine contained only 1.8436 grams per 100 c.c. Doubtless, however, differences in the methods of treating the grape in the manufacture of the wine, the processes of plastering and mixing, as well as the variations the artistic mixer of wines may introduce, all have an influence in determining the character of this solid residue, which seems far more potent than the alcohol in acting upon the digestive process.

Hence, we may conclude that wines as a class, taken in small amount, have little or no deleterious influence upon the chemical processes of gastric digestion. In small amounts they may even increase somewhat the rate of digestive action owing to the alcohol, and perhaps other substances, contained in them. In larger quantities they have more or less of a retarding effect upon gastric digestion; an effect which is dependent rather upon the character and amount of the solid matter present in the fluid than upon the contained alcohol, bouquet-flavoring, or other volatile material. Indeed, wines differ most markedly from liquors of the brandy and whiskey type, in that their action upon gastric digestion is not at all proportional to their content of alcohol. As we have seen,

<sup>1</sup> Being the volatile matter, alcohol, etc., obtainable from an amount of wine equivalent to 10 per cent. of the original hochheimer.

whiskeys, brandies, etc., owe their action upon pepsin-proteolysis almost wholly to the contained alcohol, while in wines, say with 10 per cent. of alcohol, the alcohol is of minor importance so far as the influence of the fluid upon the solvent or digestive power of the gastric juice is concerned.

#### DIRECT COMPARISON OF THE ACTION OF SOME OF THE FOREGOING LIQUORS.

The comparative action of the alcoholic fluids thus far studied has perhaps been made sufficiently clear, but inasmuch as the conditions under which proteolysis occurs have such an important bearing upon the rate of digestion, we have deemed it wise to make an experiment with representatives of the different liquors in which all of the attendant conditions should be identical. The results are shown in the following experiment:

#### *Experiment 67.*

##### Conditions:

Proteid = blood-fibrin (2 grams).

0.016 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $2\frac{1}{2}$  hours at  $38^{\circ}$ – $40^{\circ}$  C.

| Fluid used,<br>5 per cent. | Alcoholic<br>strength. <sup>1</sup> | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteo-<br>lytic action. |
|----------------------------|-------------------------------------|-----------------------|----------------------|-----------------------------------|
| 0                          | 0                                   | 0.2013 gram.          | 90.0 per cent.       | 100.0                             |
| Absol. alcoh.              | 99.5 per cent.                      | 0.2601 "              | 87.0 "               | 96.6                              |
| Rum                        | 51.0 "                              | 0.2304 "              | 88.5 "               | 98.3                              |
| Whiskey                    | 50.5 "                              | 0.2312 "              | 88.5 "               | 98.3                              |
| Brandy                     | 47.5 "                              | 0.2251 "              | 88.8 "               | 98.7                              |
| Sherry                     | 21.0 "                              | 0.3041 "              | 84.8 "               | 94.2                              |
| Hochheimer                 | 11.0 "                              | 0.2439 "              | 87.9 "               | 97.6                              |
| Claret                     | 10.0 "                              | 0.2560 "              | 87.2 "               | 96.8                              |

These results, obtained under exactly similar conditions, are suggestive in that they show so clearly the relative retarding action of these several alcoholic fluids. Sherry, with its high content of solid matter (about 4.75 per cent.), shows the greatest retarding action, while claret and absolute alcohol come next, followed by the hochheimer. Rum, whiskey, and brandy, with the highest content of alcohol, produce the least effect, in harmony with the preceding experiments, so that we again have evidence of the greater retarding effect of the solid matters contained in wines. Alcohol plainly reduces the rate of pepsin-proteolysis, but 5 per cent. of pure absolute alcohol has no greater retarding action than the same percentage of claret with only one-tenth as much absolute alcohol. Again, rum, whiskey, and brandy cause approximately only half the retardation that the same percentage of claret will produce, although the latter contains only one-fifth as much absolute alcohol.

<sup>1</sup> Being the content of alcohol in the fluid added.

## ACTION OF MALT LIQUORS.

Under this term are included a large variety of beverages, such as beers, ales, porter, stout, etc., all of which are supposed to contain only a comparatively small amount of alcohol, with a relatively large amount of extractive matter. "The composition of malt liquors varies greatly according to the materials used, the method of brewing, the season, and the use for which it is intended. . . . The chemical composition is very complex, the principal constituents being alcohol, various sugars, and carbohydrates, nitrogenous matter, carbonic, acetic, succinic, lactic, malic, and tannic acids, bitter and resinous extractive materials from the hops, glycerin, and various mineral constituents, consisting mainly of phosphates of the alkalies and alkali earths."<sup>1</sup>

The following table shows the maximum and minimum content of alcohol, extract, and ash in 476 samples obtained in American markets:<sup>2</sup>

| Kind.            | Maximum.           |           |           | Minimum.           |           |           |
|------------------|--------------------|-----------|-----------|--------------------|-----------|-----------|
|                  | Alcohol by weight. | Extract.  | Ash.      | Alcohol by weight. | Extract.  | Ash.      |
|                  | Per cent.          | Per cent. | Per cent. | Per cent.          | Per cent. | Per cent. |
| Lager . . . . .  | 7.061              | 9.647     | 0.412     | 0.677              | 3.655     | 0.172     |
| Ale . . . . .    | 8.994              | 9.501     | 0.552     | 2.410              | 2.703     | 0.197     |
| Porter . . . . . | 6.695              | 11.783    | 0.557     | 1.671              | 2.848     | 0.170     |
| Weiss . . . . .  | 3.179              | 4.143     | 0.486     | 0.755              | 1.277     | 0.069     |

A recent examination<sup>3</sup> of Munich beer made in the analytical laboratory of the London *Lancet*, with which the composition of English beer has been contrasted, gave the following results:

|                        | Munich beer.<br>Löwenbrau. |                | English beers. |  |
|------------------------|----------------------------|----------------|----------------|--|
|                        |                            | Mild.          | Bitter.        |  |
| Alcohol by weight      | 3.55 per cent.             | 6.78 per cent. | 5.44 per cent. |  |
| Alcohol by volume      | 4.45 "                     | 8.45 "         | 6.78 "         |  |
| Equal to proof-spirit  | 7.80 "                     | 14.81 "        | 11.89 "        |  |
| Total malt extractives | 7.09 "                     | 6.74 "         | 5.42 "         |  |
| Mineral matters        | 0.36 "                     | 0.43 "         | 0.24 "         |  |
| Albuminous matters     | 0.57 "                     | 0.26 "         | 0.16 "         |  |
| Maltose and dextrin    | 6.15 "                     | 5.77 "         | 4.22 "         |  |

*Toledo Lager Beer.*

A partial analysis of this beer gave us the following results:

|                             |                           |
|-----------------------------|---------------------------|
| Specific gravity . . . . .  | 1.019 (at 17.5° C.).      |
| Alcohol by volume . . . . . | 2.75 per cent.            |
| Extract . . . . .           | 5.9856 grams per 100 c.c. |
| Ash . . . . .               | 0.1820 gram " "           |

<sup>1</sup> Bulletin 13, part 3, p. 275, U. S. Department of Agriculture, Division of Chemistry.

<sup>2</sup> Ibid., p. 279.

<sup>3</sup> London *Lancet*, February 16, 1895.



*Experiment 68.*

Conditions:

Proteid = fluid egg-albumin (15 c.c.).

15 c.c. of the albumin solution contain 1.3395 grams dry albumin.

0.006 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion 7 hours at 38°-40° C.

| Beer.         | Undigested albumin. | Proteid digested. | Relative proteolytic action. |
|---------------|---------------------|-------------------|------------------------------|
| 0 per cent.   | 0.4121 gram.        | 69.3 per cent.    | 100.0                        |
| 1    "        | 0.4110   "          | 69.4    "         | 100.1                        |
| 3    "        | 0.4347   "          | 67.6    "         | 97.5                         |
| 5    "        | 0.4314   "          | 67.8    "         | 97.8                         |
| 7    "        | 0.5183   "          | 61.4    "         | 88.6                         |
| Beer residue. |                     |                   |                              |
| 1 per cent.   | 0.4042   "          | 69.9    "         | 100.9                        |
| 7    "        | 0.4546   "          | 66.1    "         | 95.3                         |

*Milwaukee Bock Beer.*

This sample of beer, "Milwaukee Lager Beer, Pabst's Bock," had the following composition:

|                             |                           |
|-----------------------------|---------------------------|
| Specific gravity . . . . .  | 1.017 (at 17.5° C.).      |
| Alcohol by volume . . . . . | 2.5 per cent.             |
| Extract . . . . .           | 2.6479 grams per 100 c.c. |
| Ash . . . . .               | 0.1462 gram   "   "       |

*Experiment 69.*

Conditions:

Proteid = blood-fibrin (2 grams).

0.016 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion 1½ hours at 38°-40° C.

| Beer.         | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|---------------|--------------------|-------------------|------------------------------|
| 0 per cent.   | 0.2829 gram.       | 85.9 per cent.    | 100.0                        |
| 1    "        | 0.2738   "         | 86.4    "         | 100.5                        |
| 3    "        | 0.3085   "         | 84.6    "         | 98.4                         |
| 6    "        | 0.3183   "         | 84.1    "         | 97.9                         |
| Beer residue. |                    |                   |                              |
| 6 per cent.   | 0.3079   "         | 84.6    "         | 98.4                         |

*New Haven Lager Beer.*

This beer gave on analysis the following results:

|                             |                           |
|-----------------------------|---------------------------|
| Specific gravity . . . . .  | 1.026 (at 18° C.).        |
| Alcohol by volume . . . . . | 1.5 per cent.             |
| Extract . . . . .           | 7.1236 grams per 100 c.c. |
| Ash . . . . .               | 0.2192 gram   "   "       |

*Experiment 70.*

Conditions:

Proteid = cooked and washed beef proteid (10 grams moist).

10 grams beef proteid contain 4.3262 grams dry proteid.

0.016 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $7\frac{1}{2}$  hours at  $38^{\circ}$ – $40^{\circ}$  C.

| Beer.       | Undigested<br>proteid. | Proteid<br>digested. | Relative proteolytic<br>action. |
|-------------|------------------------|----------------------|---------------------------------|
| 0 per cent. | 1.9810 grams.          | 54.3 per cent.       | 100.0                           |
| 1 "         | 1.9513 "               | 54.9 "               | 101.1                           |
| 3 "         | 2.0189 "               | 53.4 "               | 98.3                            |

*Experiment 71.*

Conditions:

Proteid = blood-fibrin (2 grams).

0.016 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $2\frac{3}{4}$  hours at  $38^{\circ}$ – $40^{\circ}$  C.

| Beer.       | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|-------------|-----------------------|----------------------|---------------------------------|
| 0 per cent. | 0.3646 gram.          | 81.8 per cent.       | 100.0                           |
| 3 "         | 0.3591 "              | 82.1 "               | 100.3                           |
| 6 "         | 0.3961 "              | 80.2 "               | 98.0                            |

*Experiment 72.*

Conditions the same as in the preceding experiment, except that the period of digestion was  $2\frac{1}{2}$  hours.

| Fluid<br>added.     | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|---------------------|-----------------------|----------------------|---------------------------------|
| 0 per cent.         | 0.4630 gram.          | 76.9 per cent.       | 100.0                           |
| 2 " absol. alcohol. | 0.4583 "              | 77.1 "               | 100.2                           |
| 10 " beer           | 0.5218 "              | 74.0 "               | 96.2                            |
| 10 " " residue      | 0.5134 "              | 74.4 "               | 96.7                            |
| 10 " " distillate   | 0.4127 "              | 79.4 "               | 103.2                           |

From these experiments with beer containing a low content of alcohol, it is seen that the tendency is toward a slight retardation of proteolysis. The extent of retardation with a given percentage of beer is dependent, however, upon the digestive strength of the gastric juice. Where digestive action is fairly strong, retardation with, say, 10 per cent. of beer is very slight, and if we are to trust the result of Experiment 72 the inhibitory action is to be connected mainly with the extractive matters present in the beer rather than with the alcohol. Indeed, the amount of alcohol in these beers is altogether too small to have any appreciable retarding action upon the chemical processes of gastric digestion unless the beverage is consumed in very large quantity.

Especially noticeable is the constant, though slight, stimulation of proteolysis caused by a small percentage of beer.

According to Roberts, beer, when "well up," is distinctly more favorable to quick digestion than the same beer when "flat." This effect, he adds, is probably due to the mechanical effect of the escaping gas in stirring up the mixture.

#### ALE.

The ale used in the following experiments was "Burton Pale Ale," Bass & Co.'s Extra. A partial analysis of one sample gave the following results:

|                             |                           |
|-----------------------------|---------------------------|
| Specific gravity . . . . .  | 1.014 (at 20° C.).        |
| Alcohol by volume . . . . . | 4.0 per cent.             |
| Extract . . . . .           | 4.4254 grams per 100 c.c. |
| Ash . . . . .               | 0.3530 gram " "           |

In another sample the content of alcohol was 5.25 per cent.

#### Experiment 73.

Conditions:

Proteid = fluid egg-albumin (15 c.c.).  
 15 c.c. albumin solution contain 1.347 grams dry albumin.  
 0.0024 gram pepsin; 0.2 per cent. hydrochloric acid.  
 Period of digestion  $6\frac{1}{2}$  hours at 38°–40° C.

| Ale.         | Undigested albumin. | Proteid digested. | Relative proteolytic action. |
|--------------|---------------------|-------------------|------------------------------|
| 0 per cent.  | 0.7861 gram.        | 41.7 per cent.    | 100.0                        |
| 1 "          | 0.7908 "            | 41.3 "            | 99.0                         |
| 3 "          | 0.7826 "            | 41.9 "            | 100.3                        |
| 5 "          | 0.8304 "            | 38.4 "            | 92.0                         |
| 7 "          | 0.8496 "            | 37.0 "            | 88.7                         |
| Ale residue. |                     |                   |                              |
| 1 per cent.  | 0.7498 "            | 44.0 "            | 105.5                        |
| 7 "          | 0.8094 "            | 40.0 "            | 95.9                         |

#### Experiment 74.

Conditions:

Proteid = blood-fibrin (2 grams).  
 0.016 gram pepsin; 0.2 per cent. hydrochloric acid.  
 Period of digestion  $2\frac{1}{2}$  hours at 38°–40° C.

| Ale.        | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------|--------------------|-------------------|------------------------------|
| 0 per cent. | 0.4263 gram.       | 78.7 per cent.    | 100.0                        |
| 1 "         | 0.4528 "           | 77.4 "            | 98.3                         |
| 3 "         | 0.4636 "           | 76.9 "            | 97.7                         |
| 6 "         | 0.5031 "           | 74.9 "            | 95.1                         |

#### Experiment 75.

Conditions same as in the preceding experiment, except that the period of digestion was  $1\frac{3}{4}$  hours.



|    | Fluid added.             | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|----|--------------------------|--------------------|-------------------|------------------------------|
| 0  | per cent.                | 0.5068 gram.       | 74.7 per cent.    | 100.0                        |
| 2  | " absol. alcohol.        | 0.4970 "           | 75.2 "            | 100.6                        |
| 10 | " ale                    | 0.7218 "           | 64.0 "            | 85.6                         |
| 10 | " " distillate           | 0.5302 "           | 73.5 "            | 98.8                         |
| 10 | " " residue <sup>1</sup> | 0.6988 "           | 65.1 "            | 87.1                         |
| 10 | " " " 2                  | 0.7060 "           | 64.7 "            | 86.6                         |

The results are essentially of the same order as those obtained with beer, although the ale appears to have a somewhat greater retarding action than lager beer.

#### PORTER.

The porter used in our experiments was labelled "Feigenspan's," Newark, and had the following composition:

|                             |                           |
|-----------------------------|---------------------------|
| Specific gravity . . . . .  | 1.011 (at 18.5° C.).      |
| Alcohol by volume . . . . . | 3.75 per cent.            |
| Extract . . . . .           | 4.4470 grams per 100 c.c. |
| Ash . . . . .               | 0.2586 gram " "           |

#### Experiment 76.

Conditions:

Proteid = blood-fibrin (2 grams).  
 0.016 gram pepsin; 0.2 per cent. hydrochloric acid.  
 Period of digestion  $2\frac{5}{12}$  hours at 38°-40° C.

|   | Porter.   | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|---|-----------|--------------------|-------------------|------------------------------|
| 0 | per cent. | 0.3401 gram.       | 83.0 per cent.    | 100.0                        |
| 1 | "         | 0.4038 "           | 79.9 "            | 96.2                         |
| 3 | "         | 0.4226 "           | 78.9 "            | 95.0                         |
| 6 | "         | 0.4335 "           | 78.4 "            | 94.4                         |

#### Experiment 77.

Conditions the same as in the preceding experiment, except that the period of digestion was  $2\frac{1}{4}$  hours.

|    | Fluid added.             | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|----|--------------------------|--------------------|-------------------|------------------------------|
| 0  | per cent.                | 0.3881 gram.       | 80.6 per cent.    | 100.0                        |
| 4  | " absol. alcohol.        | 0.4118 "           | 79.5 "            | 98.6                         |
| 10 | " porter                 | 0.4208 "           | 79.0 "            | 98.0                         |
| 10 | " " distillate           | 0.3783 "           | 81.1 "            | 100.6                        |
| 10 | " " residue <sup>3</sup> | 0.4480 "           | 77.6 "            | 96.2                         |
| 10 | " " " 4                  | 0.4447 "           | 77.8 "            | 96.5                         |

Porter is thus seen to have about the same retarding action on pepsin-proteolysis as lager beer, although not showing the stimulation so char-

<sup>1</sup> Made up so as to contain 4 per cent. of alcohol.

<sup>3</sup> Made up to contain 4 per cent. of alcohol.

<sup>2</sup> Dissolved in water.

<sup>4</sup> Dissolved in water.

acteristic of small quantities of this latter fluid. Further, such retardation as is produced is associated mainly with the presence of the extractives rather than with the volatile matters present in the fluid.

### STOUT.

The stout used was "Guinness's Dublin Stout," with the following composition :

|                             |                           |
|-----------------------------|---------------------------|
| Specific gravity . . . . .  | 1.013.                    |
| Alcohol by volume . . . . . | 5.5 per cent.             |
| Extract . . . . .           | 5.4220 grams per 100 c.c. |
| Ash . . . . .               | 0.3612 gram " "           |

#### *Experiment 78.*

Conditions :

Proteid = blood-fibrin (2 grams).

0.016 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion  $2\frac{1}{2}$  hours at  $38^{\circ}$ – $40^{\circ}$  C.

| Stout.      | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------|--------------------|-------------------|------------------------------|
| 0 per cent. | 0.4263 gram.       | 78.7 per cent.    | 100.0                        |
| 1 " "       | 0.4133 "           | 79.4 "            | 100.8                        |
| 3 " "       | 0.4440 "           | 77.8 "            | 98.8                         |
| 6 " "       | 0.4839 "           | 75.9 "            | 96.4                         |

#### *Experiment 79.*

Conditions the same as in the preceding experiment, except that the period of digestion was 2 hours.

| Fluid added.                | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-----------------------------|--------------------|-------------------|------------------------------|
| 0 per cent.                 | 0.5315 gram.       | 73.5 per cent.    | 100.0                        |
| 2 " absol. alcoh.           | 0.5390 "           | 73.1 "            | 99.4                         |
| 10 " stout                  | 0.6582 "           | 67.1 "            | 91.2                         |
| 10 " " distillate           | 0.5317 "           | 73.5 "            | 100.0                        |
| 10 " " residue <sup>1</sup> | 0.6665 "           | 66.7 "            | 90.7                         |
| 10 " " " <sup>2</sup>       | 0.6675 "           | 66.7 "            | 90.7                         |

Here, again, we have essentially the same results as were obtained with lager beer and ale. With 10 per cent. of stout there is a distinct retardation of pepsin-proteolysis, perhaps even greater than with either of the other fluids of this class; a retardation, however, that is due almost wholly to the contained extractives rather than to the alcohol or other volatile matters. Thus, while the distillate from this liquor is entirely without action upon pepsin-proteolysis, the residue or extractive matter inhibits digestion to about the same extent as the beverage itself.

Taken collectively, our experiments with malt liquors tend to show that the retarding effect of these fluids is, as is the case with wines,

<sup>1</sup> Made up to contain 4 per cent. of alcohol.

<sup>2</sup> Dissolved in water.

altogether out of proportion to their content of alcohol. Containing, as a rule, not much more than 4 to 6 per cent. of alcohol, the latter, when consumed in the ordinary forms of malt liquors, can have very little influence upon the chemical processes of gastric digestion. When, however, these beverages are consumed very freely with the meals, so that the digesting mass in the stomach contains 50 or 60 per cent. of these fluids, one can easily see from the results reported that the retarding action upon the solvent or digestive power of the gastric juice must be very considerable, owing to the action of the extractives they contain. Taken in small quantities, on the other hand, these malt liquors are without any marked effect upon the proteolytic action of the gastric juice.

The inhibitory action of these fluids is to be compared with the inhibitory action of such beverages as tea and coffee, the retarding action of which is equally pronounced or even greater when the latter are consumed in large quantities. In this connection it seems no more than proper to add that the extractives or solid matters ordinarily present in malt liquors are not especially peculiar in possessing this retarding action upon pepsin-proteolysis. It is, indeed, a property shared by many substances, and does not in itself necessarily constitute an evil of any great magnitude unless the retardation is very pronounced and liable to be long continued. Then, indeed, it may become a serious evil, and one sufficient to condemn the substance which causes it.

#### COMPARATIVE ACTION OF SOME ALCOHOLIC LIQUORS ON PEPSIN-PROTEOLYSIS.

The following tables, the figures of which are taken from experiments already recorded, may serve to show the relative action of given percentages of the more common alcoholic liquors on the solvent power of the gastric juice, the results in each table having been obtained under exactly similar conditions :

| Per cent. of liquor in<br>each digestive mixture. | Relative proteolytic action. |         |
|---------------------------------------------------|------------------------------|---------|
|                                                   | Sherry.                      | Beer.   |
| 0 per cent.                                       | 100.0                        | 100.0   |
| 1 "                                               | 95.5                         | 101.1   |
| 3 "                                               | 94.8                         | 98.3    |
|                                                   | Sherry.                      | Beer.   |
| 0 per cent.                                       | 100.0                        | 100.0   |
| 3 "                                               | 97.4                         | 100.3   |
| 6 "                                               | 96.5                         | 98.0    |
|                                                   | Whiskey.                     | Brandy. |
| 0 per cent.                                       | 100.0                        | 100.0   |
| 1 "                                               | 100.3                        | 100.6   |
| 3 "                                               | 100.0                        | 99.7    |
| 6 "                                               | 98.4                         | 99.8    |



| Per cent. of liquor in<br>each digestive mixture. | Relative proteolytic action. |             |
|---------------------------------------------------|------------------------------|-------------|
|                                                   | Brandy.                      | Sherry.     |
| 0 per cent.                                       | 100.0                        | 100.0       |
| 10 "                                              | 97.0                         | 90.8        |
|                                                   |                              |             |
|                                                   | Whiskey.                     | Hochheimer. |
| 0 per cent.                                       | 100.0                        | 100.0       |
| 10 "                                              | 99.1                         | 97.2        |
|                                                   |                              |             |
|                                                   | Claret.                      | Porter.     |
| 0 per cent.                                       | 100.0                        | 100.0       |
| 1 "                                               | 100.9                        | 96.2        |
| 3 "                                               | 96.6                         | 95.0        |
| 6 "                                               | 98.0                         | 94.4        |
|                                                   |                              |             |
|                                                   | Stout.                       | Ale.        |
| 0 per cent.                                       | 100.0                        | 100.0       |
| 1 "                                               | 100.8                        | 98.3        |
| 3 "                                               | 98.8                         | 97.7        |
| 6 "                                               | 96.4                         | 95.1        |
|                                                   |                              |             |
|                                                   | Bock-beer.                   | Hochheimer. |
| 0 per cent.                                       | 100.0                        | 100.0       |
| 1 "                                               | 100.5                        | 100.6       |
| 3 "                                               | 98.4                         | 98.2        |
| 6 "                                               | 97.9                         | 96.2        |

Before leaving this phase of our subject it may be wise to emphasize again the exact scope of these experiments. It is to be remembered that the results here recorded are capable merely of throwing light upon the influence of the various alcoholic beverages on the digestive or solvent power of the gastric juice. They are not broadly applicable to a determination of the influence of the liquors in question on gastric digestion, since they afford no light as to the influence of these fluids upon the secretion of gastric juice, or upon the mechanical movements of the stomach, or upon the process of absorption. Hence, if we are to be governed by facts, we are not as yet ready to draw any broad generalizations as to the influence of alcoholic liquors upon gastric digestion. We must at present confine ourselves to the influence of these liquors upon the solvent or digestive action of pepsin-hydrochloric acid or gastric juice, and upon this question the results here recorded speak fully and clearly.

#### PANCREATIC DIGESTION.

In studying the influence of alcoholic fluids upon pancreatic digestion our experiments have been limited mainly to the proteolytic action, or albumin-digesting power, of the fluid, since this may be considered as the most important digestive function of the secretion. Further, in our experiments with saliva, to be detailed later on, we have acquired all that seems necessary for us to know regarding the influence of alcoholic fluids

upon the starch-digesting power of the amylolytic ferments common to both the saliva and the pancreatic fluid. So far as our knowledge at present extends, there is no difference between the saliva and pancreatic juice in their digestive action on farinaceous foods, so that what is found true with regard to the amylolytic action of the saliva is also applicable to the pancreatic fluid. Hence, in studying pancreatic digestion, our experiments have been limited to the influence of alcoholic fluids upon the tryptic ferment which is so characteristic of this secretion.

The natural secretion from the pancreatic gland has an alkaline reaction, but in the small intestine pancreatic digestion is as liable to be carried on in a neutral reacting fluid as in an alkaline medium, and as our experiments were designed mainly to show the action of the various alcoholic fluids upon the digestive power of the ferment, it seemed best to use a neutral reacting pancreatic juice. The latter was prepared, according to the method originally suggested by Kühne, from dried pancreas which had been previously extracted with alcohol and ether.<sup>1</sup> Forty grams of the prepared pancreas were warmed at 40° C. for twenty-four hours with 500 c.c., 0.1 per cent. salicylic acid, the solution filtered and neutralized with dilute sodium carbonate and then diluted with water to 1000 or 1500 c.c. In order to prevent the possibility of putrefactive changes, crystals of thymol were kept floating on the fluid.

In testing the digestive or proteolytic action of the pancreatic juice under the various conditions set forth, 1 gram of dry, pulverized blood-fibrin was weighed out into a suitable flask, 25 c.c. of water containing sufficient of the alcoholic liquor to give the desired percentage to the whole mixture were then added, followed by 25 c.c. of the neutral pancreatic juice, thus making a total volume of 50 c.c. for each mixture. The mixtures of each series were then placed in the same water-bath at 38°–40° C., where they were kept at the body-temperature for six to seven hours with frequent shaking,<sup>2</sup> the flasks being tightly stoppered. At the end of the given period the undissolved fibrin was filtered off on weighed filter-papers, washed thoroughly with warm water, and then dried at 110° C. until of constant weight. In this manner it was possible to measure very accurately the influence of various forms and quantities of alcoholic liquors upon the pancreatic digestion of proteid foods.

In view of the position which pancreatic digestion occupies in the digestive process, it is readily seen that it is more desirable to ascertain the influence of small quantities of alcoholic liquors than large amounts, since absorption must naturally lead to a decided diminution of alcohol, etc., before these fluids can normally become mixed with the pancreatic

<sup>1</sup> Untersuchungen aus der physiol. Institute d. Universität Heidelberg, Band i, p. 222.

<sup>2</sup> Each mixture contained a trace of thymol and sodium salicylate sufficient to prevent putrefaction.

juice and partially digested food-material in the small intestine. Hence, we have laid more stress, as a rule, upon the influence of small percentages of the various fluids experimented with, and only occasionally have tried the action of large quantities.

#### ACTION OF ABSOLUTE ALCOHOL (99.5 TO 100 PER CENT.).

##### *Experiment 80.*

Period of digestion 7 hours.

| Absolute alcohol.        | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|--------------------------|--------------------|-------------------|------------------------------|
| 0 per cent. <sup>1</sup> | 0.5677 gram.       | 43.3 per cent.    | 100.0                        |
| 2 "                      | 0.6102 "           | 39.0 "            | 90.0                         |
| 5 "                      | 0.6574 "           | 34.3 "            | 79.2                         |
| 10 "                     | 0.7394 "           | 26.1 "            | 60.2                         |
| 20 "                     | 0.8446 "           | 15.6 "            | 36.0                         |

##### *Experiment 81.*

Period of digestion 6 hours.

| Absolute alcohol. | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------------|--------------------|-------------------|------------------------------|
| 0 per cent.       | 0.3467 gram.       | 65.33 per cent.   | 100.0                        |
| 0.25 "            | 0.3375 "           | 66.25 "           | 101.4                        |
| 0.50 "            | 0.3563 "           | 64.37 "           | 98.5                         |
| 1.00 "            | 0.3599 "           | 64.01 "           | 97.9                         |
| 2.00 "            | 0.3521 "           | 64.79 "           | 99.2                         |
| 3.00 "            | 0.3780 "           | 62.20 "           | 95.2                         |

##### *Experiment 82.*

Period of digestion 6 hours.

| Absolute alcohol. | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------------|--------------------|-------------------|------------------------------|
| 0 per cent.       | 0.3058 gram.       | 69.42 per cent.   | 100.0                        |
| 1 "               | 0.3220 "           | 67.80 "           | 97.6                         |
| 3 "               | 0.3689 "           | 63.11 "           | 90.9                         |
| 5 "               | 0.3888 "           | 61.12 "           | 88.0                         |
| 10 "              | 0.5080 "           | 49.20 "           | 70.8                         |
| 15 "              | 0.5931 "           | 40.69 "           | 58.6                         |
| 20 "              | 0.7012 "           | 29.88 "           | 43.0                         |

These results with absolute alcohol indicate that the proteolytic ferment of the pancreatic juice is more sensitive to absolute alcohol than the ferment of the gastric juice. Retardation of digestive action is more pronounced even with small amounts of alcohol. Further, as in the case with pepsin, the weaker the digestive powers of the pancreatic juice the greater the retarding action of absolute alcohol. This is clearly

<sup>1</sup> The percentages of fluid added are in every instance given by volume unless otherwise specified.



seen in comparison of Experiments 80 and 82, and is quite in harmony with what is known regarding the general nature of the digestive ferments or enzymes. When the amount of alcohol present in the digesting mixture is less than 1 per cent. the retardation of digestive action is very slight, provided the ferment is fairly vigorous in its action.

### WHISKEY (WITH 50 PER CENT. OF ALCOHOL).

#### *Experiment 83.*

Period of digestion 8 hours.

| Whiskey.          | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|-------------------|-----------------------|----------------------|---------------------------------|
| 0 per cent.       | 0.5147 gram.          | 48.6 per cent.       | 100.0                           |
| 1    "            | 0.5390   "            | 46.1   "             | 94.8                            |
| 3    "            | 0.5556   "            | 44.5   "             | 91.5                            |
| 5    "            | 0.5635   "            | 43.7   "             | 89.9                            |
| 10   "            | 0.5972   "            | 40.3   "             | 82.9                            |
| Absolute alcohol. |                       |                      |                                 |
| 5 per cent.       | 0.5621   "            | 43.8   "             | 90.1                            |

#### *Experiment 84.*

Period of digestion  $7\frac{1}{4}$  hours.

| Fluid<br>added.         | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|-------------------------|-----------------------|----------------------|---------------------------------|
| 0 per cent.             | 0.3272 gram.          | 67.3 per cent.       | 100.0                           |
| 10   "   whiskey        | 0.4002   "            | 60.0   "             | 89.1                            |
| 10   "   "   distil.    | 0.3860   "            | 61.4   "             | 91.2                            |
| 10   "   "   residue    | 0.3360   "            | 66.4   "             | 98.6                            |
| 5    "   absol. alcohol | 0.3858   "            | 61.5   "             | 91.3                            |

From these results it is plain that even small amounts of whiskey are detrimental to the digestive action of pancreatic juice on proteid foods. The sensitiveness of the enzyme to this form of alcoholic liquor is quite marked. Further, it is to be noticed that, as with alcohol, the weaker the digestive fluid the stronger is the retarding action of the whiskey. It is also seen that the inhibition produced by a given percentage of whiskey is somewhat greater than that caused by a corresponding percentage of alcohol, thus indicating that there must be some other retarding agent aside from the alcohol present in the whiskey. The general character of this substance is apparent when we compare the action of the distillate and the residue from a given volume of whiskey with that of the whiskey itself.

Thus, the distillate, *i. e.*, the volatile matter of the whiskey, causes less retardation of digestive action than the whiskey itself, although its action is exactly equal to that of a corresponding strength of absolute alcohol. Hence, the difference in action must be attributed to the character of the solid matter present in the liquor, even though the amount present is

small.<sup>1</sup> The experiment, indeed, shows that the residue has a sufficient inhibitory action upon tryptic digestion to account fully for the difference in action between whiskey and a corresponding strength of alcohol. As the whiskey residue is decidedly acid in reaction, and the tryptic ferment is well known to be sensitive to the presence of acids, it is reasonable to assume that it is the presence of the latter which is the cause in part, at least, of the greater inhibitory action of the whiskey over that of corresponding strengths of alcohol.

#### INFLUENCE OF SO-CALLED FUSEL OILS ON THE PROTEOLYTIC ACTION OF PANCREATIC JUICE.

As already described under the head of gastric digestion, whiskey, brandy, and other distilled liquors of this class are supposedly liable to contamination with so-called fusel oils, of which the higher alcohols are the chief constituents.

We have therefore studied the influence of a number of representative alcohols of this type upon trypsin-proteolysis with a view to ascertaining what effect their possible presence in whiskeys and other like liquors might have upon the rate of pancreatic digestion.<sup>2</sup>

#### AMYL ALCOHOL.

##### *Experiment 85.*

Period of digestion 6 hours.

| Amyl alcohol. | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|---------------|--------------------|-------------------|------------------------------|
| 0 per cent.   | 0.4090 gram.       | 59.1 per cent.    | 100.0                        |
| 0.05 "        | 0.4113 "           | 58.8 "            | 99.6                         |
| 0.10 "        | 0.4117 "           | 58.8 "            | 99.5                         |
| 0.25 "        | 0.4149 "           | 58.5 "            | 99.0                         |
| 0.50 "        | 0.4200 "           | 58.0 "            | 98.1                         |
| 1.00 "        | 0.4740 "           | 52.6 "            | 89.0                         |
| 2.00 "        | 0.5140 "           | 48.6 "            | 82.2                         |

##### *Experiment 86.*

Period of digestion 6 hours.

| Amyl alcohol. | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|---------------|--------------------|-------------------|------------------------------|
| 0 per cent.   | 0.3107 gram.       | 68.9 per cent.    | 100.0                        |
| 0.05 "        | 0.3153 "           | 68.4 "            | 99.1                         |
| 0.10 "        | 0.3442 "           | 65.5 "            | 95.1                         |
| 0.25 "        | 0.3350 "           | 66.5 "            | 96.4                         |
| 0.50 "        | 0.3462 "           | 65.3 "            | 94.8                         |
| 1.00 "        | 0.4027 "           | 59.7 "            | 86.6                         |
| 2.00 "        | 0.4598 "           | 54.0 "            | 78.8                         |

<sup>1</sup> The whiskey contained about 0.3 per cent. of solid matter.

<sup>2</sup> These experiments were carried out in our laboratory by Edward E. Brownell, Ph.B.

## ISOBUTYL ALCOHOL.

*Experiment 87.*

Period of digestion 6 hours.

| Isobutyl alcohol. | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------------|--------------------|-------------------|------------------------------|
| 0 per cent.       | 0.4185 gram.       | 58.1 per cent.    | 100.0                        |
| 0.05 "            | 0.4282 "           | 57.1 "            | 98.3                         |
| 0.10 "            | 0.4305 "           | 56.9 "            | 97.9                         |
| 0.25 "            | 0.4360 "           | 56.4 "            | 97.0                         |
| 0.50 "            | 0.4478 "           | 55.2 "            | 94.9                         |
| 1.00 "            | 0.4491 "           | 55.0 "            | 94.7                         |
| 2.00 "            | 0.4827 "           | 47.5 "            | 81.7                         |

*Experiment 88.*

Period of digestion 6 hours.

| Isobutyl alcohol. | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------------|--------------------|-------------------|------------------------------|
| 0 per cent.       | 0.3776 gram.       | 62.2 per cent.    | 100.0                        |
| 0.05 "            | 0.3796 "           | 62.0 "            | 99.7                         |
| 0.10 "            | 0.3890 "           | 61.1 "            | 98.1                         |
| 0.25 "            | 0.3864 "           | 61.3 "            | 98.5                         |
| 0.50 "            | 0.4116 "           | 58.8 "            | 94.5                         |
| 1.00 "            | 0.4230 "           | 57.7 "            | 92.7                         |
| 2.00 "            | 0.4561 "           | 54.3 "            | 81.5                         |

*Experiment 89.*

Period of digestion 6 hours.

| Isobutyl alcohol. | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------------|--------------------|-------------------|------------------------------|
| 0 per cent.       | 0.2980 gram.       | 70.2 per cent.    | 100.0                        |
| 1 "               | 0.3334 "           | 66.6 "            | 94.9                         |
| 3 "               | 0.4052 "           | 59.4 "            | 84.7                         |
| 5 "               | 0.5431 "           | 45.6 "            | 65.0                         |
| 10 "              | 0.7333 "           | 26.6 "            | 37.9                         |
| 15 "              | 0.7748 "           | 22.5 "            | 32.1                         |
| 20 "              | 0.7813 "           | 21.8 "            | 31.1                         |

## PROPYL ALCOHOL.

*Experiment 90.*

Period of digestion 6 hours.

| Propyl alcohol. | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-----------------|--------------------|-------------------|------------------------------|
| 0 per cent.     | 0.4096 gram.       | 59.0 per cent.    | 100.0                        |
| 0.05 "          | 0.4088 "           | 59.1 "            | 100.1                        |
| 0.10 "          | 0.4081 "           | 59.2 "            | 100.2                        |
| 0.25 "          | 0.4100 "           | 59.0 "            | 99.9                         |
| 0.50 "          | 0.4159 "           | 58.4 "            | 98.7                         |
| 1.00 "          | 0.4333 "           | 56.6 "            | 95.9                         |
| 2.00 "          | 0.4336 "           | 56.6 "            | 95.9                         |



*Experiment 91.*

Period of digestion 6 hours.

| Propyl alcohol. | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-----------------|--------------------|-------------------|------------------------------|
| 0 per cent.     | 0.3920 gram.       | 60.8 per cent.    | 100.0                        |
| 0.05 "          | 0.3702 "           | 62.9 "            | 103.6                        |
| 0.10 "          | 0.3875 "           | 61.2 "            | 100.7                        |
| 0.25 "          | 0.3946 "           | 60.5 "            | 99.5                         |
| 0.50 "          | 0.4030 "           | 59.7 "            | 98.2                         |
| 1.00 "          | 0.4082 "           | 59.1 "            | 97.3                         |
| 2.00 "          | 0.4210 "           | 57.9 "            | 95.2                         |

*Experiment 92.*

Period of digestion 6 hours.

| Propyl alcohol. | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-----------------|--------------------|-------------------|------------------------------|
| 0 per cent.     | 0.3486 gram.       | 65.1 per cent.    | 100.0                        |
| 1 "             | 0.3420 "           | 65.8 "            | 101.0                        |
| 3 "             | 0.3900 "           | 61.0 "            | 93.6                         |
| 5 "             | 0.4456 "           | 55.4 "            | 85.1                         |
| 10 "            | 0.6032 "           | 39.6 "            | 60.9                         |
| 15 "            | 0.7850 "           | 21.5 "            | 33.0                         |
| 20 "            | 0.9255 "           | 7.4 "             | 11.4                         |

## METHYL ALCOHOL.

*Experiment 93.*

Period of digestion 6 hours.

| Methyl alcohol. | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-----------------|--------------------|-------------------|------------------------------|
| 0 per cent.     | 0.3850 gram.       | 61.5 per cent.    | 100.0                        |
| 0.25 "          | 0.3832 "           | 61.8 "            | 100.3                        |
| 0.50 "          | 0.3931 "           | 60.7 "            | 98.7                         |
| 1.00 "          | 0.3813 "           | 61.8 "            | 100.6                        |
| 2.00 "          | 0.3812 "           | 61.8 "            | 100.6                        |
| 3.00 "          | 0.3862 "           | 61.3 "            | 99.7                         |

*Experiment 94.*

Period of digestion 6 hours.

| Methyl alcohol. | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-----------------|--------------------|-------------------|------------------------------|
| 0 per cent.     | 0.3423 gram.       | 65.7 per cent.    | 100.0                        |
| 1 "             | 0.3702 "           | 62.9 "            | 95.7                         |
| 3 "             | 0.4143 "           | 58.5 "            | 89.2                         |
| 5 "             | 0.4237 "           | 57.6 "            | 87.7                         |
| 10 "            | 0.5253 "           | 47.4 "            | 72.3                         |
| 15 "            | 0.6195 "           | 38.0 "            | 56.3                         |
| 20 "            | 0.7170 "           | 28.3 "            | 43.0                         |

The following experiment was designed to show the *comparative* action of methyl, ethyl, propyl, and isobutyl alcohols upon trypsin-proteolysis. The period of digestion was six hours at 38–40°.

*Experiment 95.*

| Alcohol added. | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|----------------|--------------------|-------------------|------------------------------|
| 0 per cent.    | 0.3117 gram.       | 68.8 per cent.    | 100 0                        |
| 5 " methyl     | 0.3968 "           | 60.3 "            | 87.6                         |
| 5 " ethyl      | 0.4081 "           | 59.2 "            | 86.0                         |
| 5 " propyl     | 0.4620 "           | 53.8 "            | 78.1                         |
| 5 " isobutyl   | 0.5183 "           | 48.2 "            | 70.0                         |
| 15 " methyl    | 0.5926 "           | 40.7 "            | 59.1                         |
| 15 " ethyl     | 0.6213 "           | 37.8 "            | 54.9                         |
| 15 " propyl    | 0.8155 "           | 18.4 "            | 26.7                         |
| 15 " isobutyl  | 0.8024 "           | 19.7 "            | 28.6                         |

A careful scrutiny of all of the foregoing results obtained with the alcohols liable to be present in so-called fusel oils, shows that their inhibitory action upon trypsin-proteolysis is somewhat greater than that of ordinary ethyl alcohol. When it is considered, however, that they can at the most be present in whiskeys, brandies, and the like only in very small quantities, it is apparent that their retarding action can have little practical influence in modifying ordinary proteolytic action. Physiologically, however, the results obtained in Experiment 95 are extremely interesting, since they tend to show that the retarding action of these alcohols on trypsin-proteolysis increases with the weight of the alcohol. Thus, in digestive mixtures containing 5 per cent. of these alcohols the lowest member of the series, methyl alcohol, has the least inhibitory action, while isobutyl alcohol, the highest alcohol tested, has the greatest retarding effect. If these alcohols were present in any quantity in alcoholic liquors, their retarding action on trypsin-proteolysis would unquestionably be a very important factor; but as there is no evidence that they are ever present in more than traces their action in this direction can have little practical importance.

BRANDY (WITH 48 PER CENT. OF ALCOHOL).

*Experiment 96.*

Period of digestion  $7\frac{5}{2}$  hours.

| Brandy.           | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------------|--------------------|-------------------|------------------------------|
| 0 per cent.       | 0.5531 gram.       | 44 7 per cent.    | 100.0                        |
| 1 "               | 0 5701 "           | 43.0 "            | 96.1                         |
| 3 "               | 0 5808 "           | 42 0 "            | 93.9                         |
| 5 "               | 0.5812 "           | 41.9 "            | 93 7                         |
| 10 "              | 0.6131 "           | 38.7 "            | 86.5                         |
| Absolute alcohol. |                    |                   |                              |
| 5 per cent.       | 0 6135 "           | 38.7 "            | 86.5                         |

*Experiment 97.*

Period of digestion 8 hours.

|    | Fluid added.     | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|----|------------------|--------------------|-------------------|------------------------------|
| 0  | per cent.        | 0.2974 gram.       | 72.1 per cent.    | 100.0                        |
| 10 | " brandy         | 0.3522 "           | 64.8 "            | 89.8                         |
| 10 | " " distil.      | 0.3635 "           | 63.7 "            | 88.3                         |
| 10 | " " residue      | 0.3083 "           | 69.2 "            | 95.9                         |
| 5  | " absol. alcohol | 0.3475 "           | 65.3 "            | 90.5                         |

Here we have much the same results as were obtained with whiskey. Thus, retardation of proteolysis is quite pronounced with 10 per cent. of brandy, but with 1 per cent. it is comparatively slight. Unlike whiskey, however, the action of the brandy is due almost entirely to the alcohol it contains, although the solid matter present in it has some retarding action.

## RUM (WITH 51 PER CENT. OF ALCOHOL).

*Experiment 98.*Period of digestion  $7\frac{5}{6}$  hours.

|                   | Rum.        | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------------|-------------|--------------------|-------------------|------------------------------|
| 0                 | per cent.   | 0.5611 gram.       | 43.9 per cent.    | 100.0                        |
| 1                 | "           | 0.5805 "           | 42.0 "            | 95.6                         |
| 3                 | "           | 0.6077 "           | 39.3 "            | 89.5                         |
| 5                 | "           | 0.6230 "           | 37.7 "            | 85.8                         |
| 10                | "           | 0.6661 "           | 33.4 "            | 76.0                         |
| Absolute alcohol. |             |                    |                   |                              |
|                   | 5 per cent. | 0.6339 "           | 36.7 "            | 83.5                         |

*Experiment 99.*

Period of digestion 8 hours.

|    | Fluid added.     | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|----|------------------|--------------------|-------------------|------------------------------|
| 0  | per cent.        | 0.2794 gram.       | 72.1 per cent.    | 100.0                        |
| 10 | " rum            | 0.3620 "           | 63.8 "            | 88.0                         |
| 10 | " " distillate   | 0.3562 "           | 64.4 "            | 89.3                         |
| 10 | " " residue      | 0.2974 "           | 70.3 "            | 97.5                         |
| 5  | " absol. alcohol | 0.3475 "           | 65.3 "            | 90.5                         |

With rum, retardation of proteolysis is quite pronounced in the presence of even 5 per cent. of the liquor, although, as in other cases, the exact amount of retardation is dependent largely upon the strength or activity of the pancreatic juice. Further, while the retarding action is



due mainly to the contained alcohol, yet it is evident that the solid matter of the rum has a somewhat deleterious influence, the two factors combining to cause the slow digestive action of mixtures containing 5 and 10 per cent. of rum.

If one should attempt a comparison of the action of these strong alcoholic liquors upon pepsin-proteolysis and trypsin-proteolysis, the conclusion, we think, would be that pepsin-hydrochloric acid is far less sensitive to the action of these alcoholic fluids than trypsin. The latter is far more liable to be retarded in its digestive activity than pepsin by small amounts of these fluids. Further, in trypsin-proteolysis there is not quite so close a relationship between the extent of retardation and the content of alcohol in the fluid under examination. In other words, the tryptic ferment is not only more sensitive to the action of alcohol, but it is likewise more inclined to be affected by the various extractives, especially the acid-reacting bodies, present in these liquors than is the case with pepsin.

#### SHERRY (WITH 21 PER CENT. OF ALCOHOL AND 4.7 PER CENT. OF SOLID MATTER).

##### *Experiment 100.*

Period of digestion  $8\frac{1}{2}$  hours.

| Sherry.           | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|-------------------|-----------------------|----------------------|---------------------------------|
| 0 per cent.       | 0.5246 gram.          | 47.6 per cent.       | 100.0                           |
| 1    "            | 0.5473   "            | 45.3   "             | 95.1                            |
| 3    "            | 0.5803   "            | 42.0   "             | 88.2                            |
| 5    "            | 0.6200   "            | 38.0   "             | 79.8                            |
| 10   "            | 0.7128   "            | 28.8   "             | 60.5                            |
| Absolute alcohol. |                       |                      |                                 |
| 2 per cent.       | 0.5776   "            | 42.3   "             | 88.8                            |

##### *Experiment 101.*

Period of digestion  $7\frac{1}{4}$  hours.

| Fluid<br>added.       | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|-----------------------|-----------------------|----------------------|---------------------------------|
| 0 per cent.           | 0.3272 gram.          | 67.3 per cent.       | 100.0                           |
| 10   " sherry         | 0.4452   "            | 55.5   "             | 82.4                            |
| 10   "   " distil.    | 0.3678   "            | 63.3   "             | 94.0                            |
| 10   "   " residue    | 0.4082   "            | 59.2   "             | 87.9                            |
| 5    " absol. alcohol | 0.3858   "            | 61.5   "             | 91.3                            |

## CLARET (WITH 10 PER CENT. OF ALCOHOL AND 3.3 PER CENT. OF SOLID MATTER).

*Experiment 102.*Period of digestion  $7\frac{1}{2}$  hours.

| Claret.           | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------------|--------------------|-------------------|------------------------------|
| 0 per cent.       | 0.5799 gram.       | 42.1 per cent.    | 100.0                        |
| 1    "            | 0.5966   "         | 40.4    "         | 95.9                         |
| 3    "            | 0.6475   "         | 35.3    "         | 86.2                         |
| 5    "            | 0.6963   "         | 30.4    "         | 72.2                         |
| 10   "            | 0.8539   "         | 14.7    "         | 34.9                         |
| Absolute alcohol. |                    |                   |                              |
| 2 per cent.       | 0.6020   "         | 39.8    "         | 94.5                         |

*Experiment 103.*

Period of digestion 6 hours.

| Fluid added.            | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------------------|--------------------|-------------------|------------------------------|
| 0 per cent.             | 0.3604 gram.       | 64.0 per cent.    | 100.0                        |
| 10   "   claret         | 0.5842   "         | 41.6    "         | 65.0                         |
| 10   "   "   distil.    | 0.3963   "         | 60.4    "         | 94.3                         |
| 10   "   "   residue    | 0.5403   "         | 46.0    "         | 71.8                         |
| 1    "   absol. alcohol | 0.3973   "         | 60.3    "         | 94.2                         |

## HOCHHEIMER (WITH 11 PER CENT. OF ALCOHOL AND 1.8 PER CENT. OF SOLID MATTER).

*Experiment 104.*Period of digestion  $8\frac{1}{2}$  hours.

| Hochheimer.       | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------------|--------------------|-------------------|------------------------------|
| 0 per cent.       | 0.5325 gram.       | 46.8 per cent.    | 100.0                        |
| 3    "            | 0.5991   "         | 40.1    "         | 85.6                         |
| 5    "            | 0.6357   "         | 36.5    "         | 77.9                         |
| 10   "            | 0.7564   "         | 24.4    "         | 52.1                         |
| Absolute alcohol. |                    |                   |                              |
| 1 per cent.       | 0.5785   "         | 42.2    "         | 90.1                         |

*Experiment 105.*

Period of digestion 6 hours.

| Fluid added.            | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------------------|--------------------|-------------------|------------------------------|
| 0 per cent.             | 0.3604 gram.       | 64.0 per cent.    | 100.0                        |
| 10   "   hochheimer     | 0.5267   "         | 47.4    "         | 74.0                         |
| 10   "   "   distil.    | 0.3993   "         | 60.1    "         | 93.9                         |
| 10   "   "   residue    | 0.4760   "         | 52.4    "         | 81.8                         |
| 1    "   absol. alcohol | 0.3973   "         | 60.3    "         | 94.2                         |

## COMPARATIVE ACTION OF STRONG LIQUORS AND WINES.

*Experiment 106.*Period of digestion  $7\frac{1}{4}$  hours.

|    | Fluid<br>added.  | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|----|------------------|-----------------------|----------------------|---------------------------------|
| 0  | per cent.        | 0.5945 gram.          | 40.6 per cent.       | 100.0                           |
| 5  | " absol. alcohol | 0.6622 "              | 33.8 "               | 83.2                            |
| 10 | " whiskey        | 0.6844 "              | 31.6 "               | 77.8                            |
| 10 | " brandy         | 0.6465 "              | 35.4 "               | 87.1 <sup>1</sup>               |
| 10 | " rum            | 0.6818 "              | 31.9 "               | 78.5                            |
| 10 | " sherry         | 0.7506 "              | 25.0 "               | 61.5                            |
| 10 | " hochheimer     | 0.7850 "              | 21.5 "               | 52.9                            |
| 10 | " claret         | 0.8533 "              | 14.7 "               | 36.2                            |

Considering now the import of the results obtained by our study of the action of these wines upon trypsin-proteolysis, it is evident that these fluids have a far greater inhibitory action than the stronger liquors, such as whiskey, brandy, etc. Further, it is plain that the action of any given wine upon the tryptic digestion of proteid foods is quite independent of its content of alcohol. Retardation of digestive action is out of all proportion to the alcohol present in the fluid. Contrast, for example, the action of claret, with the smallest percentage of alcohol, with that of sherry, which contains double the amount of alcohol. Further, between claret and the white wine (hochheimer) there is a wide difference in inhibitory action, although the difference in the content of alcohol amounts to only 1 per cent. The alcohol present in these wines plainly exerts a retarding influence upon proteolysis, as is apparent from the results obtained with the distillates from the respective fluids, and in this connection it is to be noted that the retardation produced by the distillates from both claret and hochheimer is essentially the same, and, moreover, is practically identical with the retardation caused by a corresponding percentage of absolute alcohol.

The greater part of the retardation produced by these wines, however, is clearly connected with the character of the solid matter present in the fluids. Thus, it is to be noted that there is no close relationship, at least, between the amount of solid matter in the wine and its inhibitory action. We therefore sought for some explanation of the above results in the specific character of this solid or non-volatile matter, and our conclusion is that the retardation is due in great part to the amount of acid contained in the respective fluids; a conclusion which will apply not only to the wine-residues, but likewise to the solid matter contained in the stronger alcoholic fluids.

<sup>1</sup> This result is presumably too high, although we know of no cause of error.



The acidity of these fluids was determined by neutralization of a given volume with a standard solution of potassium hydroxide, containing 0.2 per cent. KOH. The relative acidity is indicated by the following figures which show the number of cubic centimetres of the alkali solution required to neutralize 25 c.c. of the respective liquors :

|                  |   |   |   |                                   |
|------------------|---|---|---|-----------------------------------|
| 25 c.c. brandy   | . | . | . | required 30 c.c. alkali solution. |
| 25 " whiskey     | . | . | . | " 3.5 " "                         |
| 25 " rum         | . | . | . | " 15.0 " "                        |
| 25 " sherry      | . | . | . | " 58.5 " "                        |
| 25 " hochheimer. | . | . | . | " 80.3 " "                        |
| 25 " claret      | . | . | . | " 87.0 " "                        |

Trypsin, the proteolytic ferment of the pancreatic juice, is well known to be extremely sensitive to the presence of acids, and when this fact is remembered we have, perhaps, in the above data, a full explanation of the marked retardation of trypsin-proteolysis caused by the above acid wines; a retardation far greater than that caused by the alcohol contained in them. Further, the inhibitory action on tryptic digestion produced by the solid matter present in whiskey, brandy, and rum is likewise to be assigned, in part at least, to this same cause. In addition to this possible explanation it must also be remembered that many neutral salts, such as are liable to be present in these liquors, likewise have an inhibitory action on proteolytic enzymes.

(To be continued.)

## A CASE OF ACUTE LEAD-ENCEPHALOPATHY WITH INTERESTING OCULAR MANIFESTATIONS.

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L. H., female, a carpet-weaver, aged twenty-two years, was sent to the Episcopal Hospital on January 31, 1894, by Drs. Francis N. Bennett and G. Oram Ring, who had recognized the conditions about to be described, attributing them to intracranial disease.

At the hospital the following history was elicited: The patient's parents were healthy. At the age of ten she had typhoid fever, and since then diphtheria, pleurisy, and malaria. One year ago she was again attacked by malaria, and had not been strong since.

In the early part of August, 1894, she began to have headaches, loss of appetite, vertigo, and dimness of vision. These symptoms increased

gradually in severity, the headaches growing more intense and the difficulty in seeing more pronounced, but not enough to prevent her from continuing at her work in her father's small carpet-factory. Near the end of October she was seized with an illness which her physician said was "grip," and which confined her to bed until a few days before Christmas.

The symptoms of this attack seem to have been an aggravation of her former ones: Constant and intense headaches, failing sight, constipation, and obstinate vomiting, the latter occurring after eating or drinking, but also quite independent of food, and usually without effort.

Shortly before Christmas an amelioration in her condition induced her to get up, but the quick return of the symptoms compelled her to go to bed again. On January 4th a convulsion occurred, evidently, from the description, epileptiform in character. On coming out of this she found herself completely blind, and continued so, with brief intervals of sight, until January 22d, when the blindness became constant.

The convulsions recurred at short intervals, but ceased about the date last mentioned. During most of this time there was more or less delirium, at times violent, and accompanied by hallucinations of sight and hearing.

About January 24th she came under the care of Dr. Bennett, with whom Dr. Ring saw her in consultation. It should be mentioned that menstruation ceased in July and did not return until some time after her entrance into the hospital.

On admission she was extremely anæmic, and there was some fullness under the eyes and oedema above the ankles. The pupils were widely dilated, and she was completely blind. There was intense headache in the occipital region and at the vertex. The tongue was coated, flabby, and covered with a light fur. A blue line was noticed at the margin of the gums, very faint and hardly perceptible over the incisors, but distinct and well defined over the molars. The breath was heavy and fetid. She complained of nausea and obstinate constipation, but there was no colic or abdominal pain of any kind. The muscles were well nourished and their function normal; there was no paralysis or tremor, nor had there been during the whole course of her illness. Neither knee-jerk nor ankle-clonus was present. The temperature was normal.

An examination of the urine revealed no albumin, sugar, or casts. The specific gravity was 1020, the reaction acid. A specimen of the urine was sent to Prof. Marshall, of the University of Pennsylvania, for analysis. A milk-diet, abundance of water, iodide of potassium, gr. x, t. i. d., and a morning-dose of salts was the treatment instituted after the urine had been examined and enough collected for Dr. Marshall's examination.

The following extracts from the hospital-notes (taken by Dr. Charles H. Frazier, resident physician) illustrate the course of the disease after admission:

*"February 7th.* Headache still present, but less intense. Still complains of nausea. Has not vomited since admission, nor have there been convulsions. Is passing about sixty ounces of urine daily, which repeated examinations show to be free from albumin or sugar. Dr. G. Oram Ring, ophthalmologist to the hospital, examined the eyes to-day, and made the following report: 'Light-perception denied. There is paresis of the right external rectus, otherwise the excursion of the eyes

is good. Pupils 6 mm. in diameter, contracting very feebly to oblique illumination (1 mm.). Ophthalmoscope: Right eye, a pronounced neuroretinitis hemorrhagica. The summit of the disk is +7 dioptries, it being swollen four dioptries above the level of the surrounding eye-ground. The veins are greatly distended, and the upper temporal and nasal arteries narrowed. The disk-edges are nowhere seen, and radiating in all directions from what is regarded as the normal border of the nerve are numerous striated hemorrhages, which, in the lower periphery, merge into an extensive hemorrhagic area distinctly suggestive of a magnificent waterfall viewed through a red glass. It is about three times the width of the average disk, and falls in irregular folds, losing itself in the extreme lower periphery. Between the points of a number of the hemorrhages are seen several yellowish-white splotches.

"Left eye. The swelling of the disk corresponds very closely to that of the right eye, the summit being +7 dioptries. The hemorrhages are more extensive than in O. D., and distinctly surround the disk in an almost solid red area, broken here and there by some yellowish splotches. The appearance noted in the lower periphery of the right eye is not present in this eye."

"13th. It has been ascertained to-day that the patient was treated with iodide of potash and bichloride of mercury for ten days prior to admission. Dr. Ring reports: 'The neuritis is extending far into the periphery, but no hemorrhages except those already noted, which in the right eye are absorbing. The general position of the hemorrhages, as surrounding the disk, is especially to be noted.'

"22d. Patient is steadily improving. There is no nausea and scarcely any headache. The appetite is so good that she has been placed upon soft diet. Iodide of potash increased to gr. xx, t. i. d., and salts every other morning.

"24th. Attempted to walk about the ward to-day; was very giddy and fainted. Prof. Marshall reported that the urine sent to him contained lead in appreciable amount.

"26th. Patient saw near objects for the first time this morning.

"March 2d. People passing in front of patient can now be discerned, but their features are indistinguishable. An examination of the urine reveals: albumin, none; specific gravity 1022; reaction acid. From 50 to 60 ounces of urine are voided in the twenty-four hours.

"19th. Dr. Ring reports 'hemorrhages in the eye-ground have been completely absorbed. Surface of the disk unduly white.' At his suggestion strychnine, gr.  $\frac{1}{48}$ , hydrarg. bichloridi, gr.  $\frac{1}{48}$ , were given thrice daily. Iodide of potassium continued, gr. xxv, t. i. d.

"24th. To-day horses and carriages in the street can be seen, and a man can be distinguished from a woman, but only in a bright light.

"Two blood-counts were made by Dr. Joseph McFarland, pathologist to the hospital. The first, shortly after admission, of which the record was lost, revealed about three million of red blood-corpuscles. The second, on March 3d, gave 4,940,000 red corpuscles, with 50 per cent. hæmoglobin.

"She continued to improve during the remainder of her stay in the hospital, and when seen in June Dr. Ring found a further gain in vision: O. D.,  $\frac{5}{cc}$ . O. S. = light-perception. Pupils, 6 mm. Under oblique



illumination the right iris contracts to 4.5 mm. and the left iris to 5 mm. There is no limitation of movement in any direction.

"The eye-grounds are best studied with +3 dioptries. There is distinct atrophy of the disk on each side. In the left eye, in addition to the atrophic nerve, there is an irregular retinal patch marking the position of one of the former hemorrhages, just beyond the temporal border of the nerve."

On September 24th the following note was made: "Vision, O. D.,  $\frac{20}{LXX}$ . O. S., fingers counted at two feet. Nerve vertically ovoid, long.

"The general appearance of the choroid is granular, excepting several minute whitish areas, the remains of former inflammation.

"Is enjoying good health, and is greatly pleased over improvement in vision. Is wearing her correcting-glass +3 spherical. She states that vision in her left eye had never been good, and that earlier in life she had a cast in the eyes, the condition having probably been one of amblyopia ex anopsia."

REMARKS BY DR. MILLER. This case is of interest from many points of view. First, as to the cause. There can be no doubt that the symptoms were due to lead, although when first seen, before the blue line was discovered, the diagnosis lay between intracranial disease (tumor or meningitis) and nephritis. The negative examination of the urine and the history of the case disposed of these affections, while the discovery of the blue line and the presence of lead in the urine were conclusive evidences as to the origin of the girl's illness.

We were for some time at a loss to discover how the poison found entrance into her system. It was at first thought it might have been in some article of diet, having in mind the cases reported some years ago by David D. Stewart,<sup>1</sup> in which teabuns and other cakes were adulterated with lead chromate to give them a yellow tint; but careful inquiry failed to show such a source, the family never eating cakes and making their own bread at home.

Her occupation, that of a carpet-weaver, was next thought of. A visit to her father's factory, a small affair, in which the patient, her father, and one man were employed in weaving cheap ingrain and rag carpets, was at first without results. It was found that for some time before the girl's illness rag-carpets alone were manufactured, and investigation among the dyers of the neighborhood, and particularly at the establishment where the yarns used in the weaving of these carpets had been purchased, showed that aniline colors were exclusively used in dyeing, although prior to ten years ago sugar of lead and lead chromate were extensively employed for this purpose.<sup>2</sup> A second visit was more successful. On this occasion we were told that since June, 1892, window-

<sup>1</sup> Medical News, June 18 and Dec. 21, 1887.

<sup>2</sup> R. C. Smith (Brit. Med. Journ., June, 1882, i. 8) reports a number of cases of lead-poisoning in weavers, in the same cotton-mill, from yellow cloth dyed with lead chromate.

shade selvage had been used almost entirely in making rag-carpets. An examination of this material revealed here and there scattered over its surface small particles of dried paint.<sup>1</sup> Throughout the summer and up until the time the patient was disabled by sickness she was engaged in unravelling the selvage and winding it into balls preparatory to weaving. In this process a great deal of dust was given off, which the patient constantly inhaled and perhaps swallowed.

At the factory where the selvage was purchased it was ascertained that ordinary lead-paint was used in coloring the shades. This evidence seemed conclusive, but, to "make assurance double sure," a quantity of the selvage and yarns was sent to Prof. John Marshall for analysis. He replied as follows: "The selvage contains a large quantity of lead. The quantity is large, because a piece about twelve inches long, which I incinerated, furnished the amount of metallic lead which I send you (about one grain), in addition to a quantity which I used in making the wet tests for the metal. The yarns I do not think it necessary to examine."

That form of lead-poisoning in which the action of the metal is limited exclusively to the central nervous system is comparatively rare. Of the immense number of cases, 1390, observed by Tanquerel des Planches,<sup>2</sup> only 72 were of this nature, and of these but 6 occurred without previous signs of lead-disease in other organs.

Those cases in which optic neuritis is a prominent feature are stated by Gowers<sup>3</sup> to take place only in individuals who have been exposed for a long time—often years—to the deleterious influence of the metal. Oliver,<sup>4</sup> however, says that they are apt to be developed, as in the case here reported, in people who have worked but a few weeks or months in a lead-factory, and who, after suffering for a variable time from intense headache and vomiting, suddenly lose sight or become convulsive. In our case pronounced symptoms made their appearance after about two months of exposure. Three months later she was compelled to give up work, and eight weeks after this convulsions, delirium, and absolute blindness occurred. This agrees with Tanquerel's<sup>5</sup> observation, that the greatest number of lead-encephalopathies develop within six months after exposure.

But more interesting than the time in which the poison takes to reveal itself in definite symptoms is the manner in which the symptoms are produced. Many would attribute them to the direct action of lead on the cerebral cells, "that a lead-saturated cell would be incapable of high

<sup>1</sup> This discovery was due to Dr. Charles H. Frazier, the resident physician, who kindly made the second visit.

<sup>2</sup> Tanquerel des Planches: *Lead Diseases*. English translation, Lowell, 1848.

<sup>3</sup> *Medical Ophthalmoscopy*, page 233.

<sup>4</sup> T. Oliver, M.A., M.D.: *Lead-poisoning*. London, 1891.

<sup>5</sup> *Loc. cit.*

function." Lead has been found in all the organs after death, but particularly in the liver and brain. Blyth<sup>1</sup> found in one case of rapidly fatal lead-poisoning, with pronounced cerebral symptoms, 105.77 mgms. of lead sulphate in the brain, 5.416 mgms. in the kidney, and 24.256 mgms. in 4029 gms. of liver; in another, presenting similar symptoms before death, the brain contained 117.1 mgms., the kidneys 178.9 mgms., and in 299 gms. of liver 24 mgms. of lead sulphate.

Oliver<sup>2</sup> remarks that in not one of his cases did the lead in the brain amount to one grain, which he thinks is a small amount to produce such serious results; but this objection is hardly tenable, since still smaller amounts are found in the kidneys, liver, and other organs; and yet the most pronounced lesions, atrophic and fibroid changes, occur as a direct result of the presence of the metal.

The pathological findings in lead-encephalopathy are variable. In 32 out of 71 autopsies Tanquerel found nothing of note. Von Monkalow<sup>3</sup> discovered a high grade of atrophy, especially marked over the frontal regions, at the vertex, and in the crura cerebri, in a case dying under his observation. Small hemorrhages in parts of the brain, as well as atheromatous conditions of the arteries, have been noted by Seifert,<sup>4</sup> Oeller,<sup>5</sup> and Oppenheim.<sup>6</sup>

Uræmia may doubtless account for some of the cases, particularly the chronic forms with the cirrhotic changes in the kidneys, which the long-continued action of lead is so apt to induce; but many of the cases, generally the more acute varieties, cannot be explained in this way. Albumin is not present in the urine, nor is the specific gravity lowered. In only one of David D. Stewart's patients was there albuminuria, and this was in a woman in the eighth month of pregnancy. The absence of albuminuria, it is true, does not by any means indicate that the kidneys are structurally perfect; but in the majority of instances it does. We may have deficient renal functions brought about by the arterial spasm, which is always more or less present in lead-poisoning. It is to this cause, aided by disturbed hepatic function and consequent deranged metabolism, that Oliver<sup>7</sup> would attribute the majority of the symptoms of saturnine encephalopathy. Elimination is interfered with, and there are retained in the blood animal poisons that act in a deleterious manner upon the brain. Support is added to this view by the recent studies of Hughes and Carter.<sup>8</sup> These investigators have shown that the symptom-complex known as uræmia may occur without any kidney-lesion, and

<sup>1</sup> A. W. Blyth: "Distribution of Lead in Brains of Two Lead-factory Operatives." *Journal of Mental Science*, London, 1887-8, xxxiii. 483-487.

<sup>2</sup> Loc. cit.

<sup>3</sup> Westphal: "Über Encephalopathia Saturnina." *Archiv für Psychatrie*, 1882, xix. p. 620.

<sup>4</sup> Ibid.

<sup>5</sup> Ibid.

<sup>6</sup> Ibid.

<sup>7</sup> Loc. cit.

<sup>8</sup> Hughes and Carter: "A Study of Uræmia." *AMERICAN JOURNAL OF THE MEDICAL SCIENCES*, Aug. and Sept. 1894.



believe there is a poison occasionally or constantly present in normal blood which is capable not only of inducing uræmia, but also nephritis and fatty degeneration of the retina.

Naunyn<sup>1</sup> adopts practically the same theory, suggesting that lead does not act as a direct poison, but indirectly, giving rise to the presence of a poison in the blood, by the abnormal nutrition of the whole system which it causes.

It is evident no one theory will explain all the phenomena of lead-encephalopathy, and we are forced to conclude that the action of the poison is a variable one. There can be little doubt, however, that the metal acts primarily on the nervous system, while, for the patient whose case is here recorded, we are inclined to accept the explanation of Oliver that the symptoms were due to the presence of a poison, whose elimination was prevented by the operation of lead on the hepatic, venous, and arterial systems.

REMARKS BY DR. RING. From the view-point of the ophthalmologist, the symptoms above noted claim attention by reason of their comparative rarity, and because they sustain the claim of T. Oliver and others that in a few well-established instances a true plumbic neuroretinitis exists, quite independent of the intraocular changes that are clearly secondary to well-known kidney-lesions.

The urine was absolutely free from albumin and casts during the entire period of her illness.

The various ocular manifestations of lead-poisoning have been recently reviewed by Dr. Casey Wood,<sup>2</sup> of Chicago, and by Dr. G. E. de Schweinitz,<sup>3</sup> of Philadelphia. A few of the positive ocular changes were recognized in the pre-ophthalmoscopic era, but it has been especially since the marvellous discovery of Helmholtz that ophthalmic literature has been enriched by many authentic publications. Very few, however, have presented the symptoms noted in the case here published.

The frequency of ocular disease in lead-poisoning may be concluded from the statement of Stood, that optic-nerve changes are present in fifty per cent. of the cases. In sixty-four cases analyzed by de Schweinitz to determine this point, optic neuritis was present in thirteen, neuroretinitis in four, optic atrophy in seventeen; so that the percentage given in the statement of Stood is not too high.

The frequent coexistence of kidney- and brain-lesions makes it exceedingly difficult at times to determine whether the intraocular changes are the direct resultant of the presence of lead, or whether they are secondary to chronic Bright's disease, or specific intracranial disease. The remark of Gowers is pertinent that "the possibility of a renal neuritis

<sup>1</sup> J. C. Wilson: "Chronic Lead-poisoning." *Am. System of Medicine*, vol. v. p. 689.

<sup>2</sup> "Toxic Amblyopie." *Annals of Ophthalmology and Otology*, July, 1894.

<sup>3</sup> Alvarenga Prize Essay: "Toxic Amblyopie." *College of Physicians, Phila.*, 1894.

must be borne in mind;" and, again, "an intracranial syphilitic growth may coexist with lead-poisoning and give rise to ocular symptoms;"<sup>1</sup> and as the ordinary treatment of lead-poisoning may remove the specific lesion, the error in attributing the condition to the wrong cause is one of comparative ease.

The divisions of the ocular manifestations of lead-poisoning may be said to be:

1. Transient amblyopia without definite ophthalmoscopic changes; the diminution of vision usually being bilateral or more marked upon one side, regarded by Thomas Oliver<sup>2</sup> as due to the anæsthetic effect of lead upon the retina and optic nerve, and by Gowers as due to the effect of lead upon the visual centres. Such attacks may occur frequently and be followed by atrophy.

If the amblyopia is incomplete, it is usually attended with concentric limitation of the field of vision and by loss of color-sense.

2. Retrobulbar neuritis, or an interstitial neuritis in that portion of the trunk of the optic nerve which lies within the optic canal, and limited to the papillomacular bundle as in cases by Uthoff, De Wecker, and Masselon (quoted by Wood), combined in some instances with a slight congestion of the nerve-head and retina, but in which a well-marked central scotoma was present; the continued poisoning by lead usually causing a change from a relative to an absolute scotoma. Annular scotomata are noted by Landolt, and occasional green vision by Gowers.

3. Optic neuritis or neuroretinitis, which, according to Oliver,<sup>3</sup> is of two kinds—one, the acute, in which the borders of the disk are swollen, ill-defined, and irregular; the disk itself hyperæmic and mottled or generally reddened; the vessels obscured or narrowed, and having delicate white lines running along their borders; the veins distended; striated hemorrhages found at the borders of the disk or in the retina; the condition being frequently followed by partial or complete restoration of sight.

The second form is usually found in the older cases in which albuminuria is present with a more or less typical picture of retinitis albuminurica, swollen disks, with extensive patches of exudate around the vessels.

I have found no reference in the recent reviews to two cases occurring in the practice of Dr. William F. Norris,<sup>4</sup> in which he notes marked choking of the disks with severe cerebral symptoms. One recovered and one died. Albumin was not present in either. Both resulted from the use of white lead as a cosmetic. Gowers<sup>5</sup> figures a case in which neuro-

<sup>1</sup> Gowers: *Diseases of the Nervous System*.

<sup>2</sup> Thomas Oliver: *Lead-poisoning*.

<sup>3</sup> *Ibid.*

<sup>4</sup> "Medical Ophthalmoscopy." *American System of Medicine*, vol. iv.

<sup>5</sup> Gowers: *Medical Ophthalmoscopy*.

retinitis was pronounced, with striated hemorrhages at the border of the disk.

The assignment of a definite cause for the optic neuritis is exceedingly difficult, owing to the variety of conditions obtaining at one and the same time. T. Oliver<sup>1</sup> suggests that it may be due to a descending neuritis or a distention of the nerve-sheath. Leber and Deutschmann,<sup>2</sup> that it may be caused by irritating particles carried by means of subarachnoid fluid from the brain-cavity to the vaginal sheaths surrounding the nerve. Jeaffreson<sup>3</sup> does not regard the neuritis as in any way especially related to lead. The mechanical action of the lead in inducing rapid effusion into the ventricles and subarachnoid spaces, he thinks, may distend the nerves' sheaths.

Menstrual disorders, especially amenorrhœa, he regards as a strong predisposing cause of the neuritis.

4. Optic-nerve atrophy consecutive to a papillitis, or chronic from its inception, and independent of any previous inflammation of the disk. In this latter condition, according to Casey Wood, there exists a slight congestion of the disk, accompanied by very little swelling; the disk eventually becoming dirty gray in tint, with white lines running along the narrowed vessels.

5. Retinitis unaccompanied by any gross changes in the nerve, but manifesting itself by changes in the bloodvessel-walls and surrounding tissues (vasculitis and perivasculitis<sup>4</sup>), at times associated with the intra-ocular lesions of kidney-disease.

6. Paralysis of external ocular muscles. One of Landesberg's<sup>5</sup> cases had a bilateral paralysis of the external rectus, another of all branches of the oculomotor, and Von Schrader's<sup>6</sup> had bilateral abducens paralysis, associated with neuroretinitis.

<sup>1</sup> Gulstonian Lectures, "Lead-poisoning," Thomas Oliver, 1891.

<sup>2</sup> Ibid.

<sup>3</sup> Clinical Lecture, "Optic Neuritis." *Lancet*, May 3, 1890.

<sup>4</sup> De Schweinitz: *Toxic Amblyopiæ*.

<sup>5</sup> Quoted by Casey Wood.

<sup>6</sup> Ibid.



## REVIEWS.

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CUTANEOUS MEDICINE: A SYSTEMATIC TREATISE ON THE DISEASES OF THE SKIN. By LOUIS A. DUHRING, M.D., Professor of Diseases of the Skin in the University of Pennsylvania. Author of *A Practical Treatise on Diseases of the Skin and Atlas of Skin Diseases*. Part I. Anatomy, Physiology, Symptomatology, Etiology, Pathology, Diagnosis, Treatment, and Prognosis. 1895.

It is not too much to say that this work promises to be the most thorough and exhaustive treatise on the subject of diseases of the skin which has ever appeared. This first part, embracing 221 pages, covering only the introductory subjects, exhibits an amount of research, an accuracy of information, and a clearness of presentation which are remarkable and which show the immense strides which this branch of medicine has taken during the past twenty-five years.

The sections on Anatomy and Physiology of the Skin cover 70 pages, and are by far the fullest presentation of the subject with which we are acquainted, including the researches of dozens of observers, with very many plates exhibiting the histological appearances, taken from a large number of works, some of them very recent.

The section on General Etiology is very intelligent and shows broad observation and a full appreciation of the general relations of diseases of the skin to systemic and other disorders. The author states emphatically that "in many instances it will be found that manifestations on the skin are but indexes or direct symptoms of disorder in other parts of the system." The subjects of diathesis, temperament, predisposition, and idiosyncrasy are discussed in a strong manner, while the relations of many skin-diseases to kidney-derangement, gout, and rheumatism, as also to the respiratory, sexual, and nervous systems, are given full consideration. The subjects of food, dentition, vaccination, etc., are also given due attention. It is gratifying in these days when local etiology and treatment are so strongly emphasized by many to find a broader view of dermatological relations so strongly presented.

External causes are also fully considered in this and the section on General Pathology, but with the remark, "Many of them are to be viewed as exciting causes, giving rise to disorder only under peculiar conditions, or in those cases where there exists a predisposition to the disease manifesting itself."

The section on General Diagnosis, though brief, is excellent, due attention being given to a consideration of the patient in regard to the state of physical health, the performance of functions, etc.

The section on General Treatment, covering over 50 pages, contains an excellent summary of the present state of dermal therapeutics, including both the older measures and those of most recent date. While local

remedies occupy the larger space, constitutional and general treatment are well considered and their necessity strongly emphasized.

The work has been styled "Cutaneous Medicine," a new title in this line of work, and from the preface, and what may be learned from this first portion, we believe that it will do much to elevate this branch of medical study and practice.

The success which has attended the three editions of the author's former *Treatise on Diseases of the Skin* will, no doubt, cause this complete and exhaustive work to be in much demand. From what we know of the author's former writings it will be a practical, safe, and valuable work for every practitioner of medicine.

While the whole is written in a very clear and readable manner, there are indications here and there of a tendency to foreign idioms in the inversion of sentences, etc.; the absence of an index renders the part less convenient for ready reference, but this will undoubtedly be fully supplied when the work is complete.

L. D. B.

TEXT-BOOK OF OPERATIVE SURGERY. By THEODORE KOCHER, Professor of Surgery and Director of the Surgical Clinic in the University of Berne. Translated with the special authority of the author from the second revised and enlarged German edition, by HAROLD J. STILES, M.B., F.R.C.S. Edin., Senior Demonstrator of Surgery and formerly Demonstrator of Anatomy in the University of Edinburgh, and Assistant Surgeon, Royal Edinburgh Hospital for Sick Children. With one hundred and eighty-five illustrations. London: Adam and Charles Black, 1895.

THIS is an English edition of Professor Kocher's well-known work on *Operative Surgery*. There is no attempt on the part of the author to make it a systematic treatise; it deals with such measures as are personally familiar to him, and the value of the book depends upon the personal elements in which it abounds. It is the actual operative creed of a well-known and experienced operator, therefore is a description of certain measures which he has found successful and commends. The work is essentially German, credit, as a rule, being only given to Continental operators, 90 per cent. of those quoted being German, while English and American names are conspicuous by their absence.

Part I. consists of a short introduction, chapters on anæsthesia and wound-treatment. Under this head preference is given to corrosive sublimate, rather than to carbolic acid, for the sterilization of the hands and cutaneous surfaces. Instruments are prepared by steaming and boiling. Iodoform is considered to hold no place in the aseptic treatment of wounds, but is regarded as the most active drug in combating suppuration just begun or already far advanced. The author's ideas of skin-incisions are somewhat at variance with those held by the majority of surgeons in this country, since he considers that they should always be governed by the natural lines of cleavage of the skin, as pointed out by Langer, rather than by the situation of cutaneous nerves or the advantage offered with regard to drainage or cosmic effect. Perfect drainage is strongly advocated by means of glass tubes, the latter to be inserted

through a special opening in the skin, rather than through the angle in the wound.

It will be noticed that in the descriptions of many special operations, as the transverse incision for suprapubic cystotomy, and a similar transverse incision in the neck for the removal of goitres, he contends that the scar which follows is less disfiguring by following the natural folds or cleavage of the skin; also that the parts in the operation are more accessible through this incision; but when large tumors are to be dealt with, a vertical incision can also be made. The author's enormous experience in this operation, however, must command our attention and respect. The method pursued in cerebral localization seems unnecessarily complicated, requiring a special instrument devised for the purpose. In abdominal operations, as gastrotomy, Albert's or Frank's method is preferred, which establishes at one operation a valve-like opening into the stomach, thus preventing escape of its contents. The Czerny-Lembert method is advocated for enterotomy, and special stress is laid upon the accurate introduction of the sutures. No mention is made of assistance to be derived from the use of buttons, plates, or rings, so extensively employed here. Lumbar colotomy is omitted, and the iliac operation is described. In paracentesis abdominis the point of puncture, as advised, is midway between the umbilicus and the middle of Poupart's ligament. In the operation for the removal of the vermiform appendix the incision is such that more muscular fibres are sacrificed than when the semilunar line is followed; the appendix is severed with the actual cautery. No mention whatever is made of McBurney's gridiron operation.

The chapter on excisions and resections is clear and most satisfactory; exception to the excision of one-half of the pelvis might however be made by conservative surgeons, although it is stated that the operation has been performed by the author with very satisfactory functional results. The patient, in whom the head of the femur was at the same time excised, can walk without a stick, although distinctly lame.

In performing nephrectomy upon the loin, it is advised that the incision be extended a little further than is usually done, in order that the peritoneum may be opened and the hand inserted to explore the other kidney. A somewhat scanty description is given of the various operations for the relief of trigeminal neuralgia, most of them dealing with the peripheral branches. No mention whatever is made of the intracranial operation for attacking the ganglion. We regret that there has been no attempt to deal with any of the plastic operations. The chapter on amputations is the least satisfactory in the book.

Enough has been said to illustrate some of the principal features of the book, and we can confidently recommend it as full of instruction. It will be appreciated more thoroughly by the operating-surgeon than by the student or young practitioner. The latter may feel that he has not sufficient guidance in the most practical and useful operations, many of those described being seldom employed except on the cadaver. The translation has been excellently accomplished by Mr. Stiles. The illustrations are admirable, and the text all that can be desired. Unfortunately, the index is omitted.

R. H. H.



KLINISCHE VORLESUNGEN ÜBER SYPHILIS. VON DURING. Hamburg und Leipzig: Leopold Voss, 1895.

CLINICAL LECTURES ON SYPHILIS. By DURING.

STIMULATED, no doubt, by the brilliant example of the younger French syphilographers the author has published an admirable volume, based upon the clinical study of syphilis. This work does not in any way pretend to be a text-book, but rather embodies the practical views of a keen observer and one who has had wide experience. The first chapter deals with the history of the disease, its distribution, and its severe manifestations when attacking people previously not infected. The character of the contagion-periods, the primary lesion and general intoxication, and parasyphilitic lesions are briefly considered. The chapter ends with a very strong argument as to the analogy of syphilis with other infectious diseases and an anatomical study of the primary lesion.

The question of immunity is considered in the second chapter, the statement being made that the acquired immunity is developed almost immediately after infection.

A consideration of the essential difference between chancroid and syphilis, to which the third chapter is devoted, would seem superfluous at the present time.

In common with most authors Von During holds that acquired syphilis is impossible without the primary lesion. The history of many minutely observed cases should certainly relegate this question to that class which is, at least, open to discussion. The complications of the primary lesion are classified into the headings phimosi, gangrene, and hemorrhage; these are scarcely sufficiently comprehensive. The blood-changes of the secondary period are carefully described. The sections dealing with the skin-eruptions of the disease correspond to those found in the ordinary text-book. Differential diagnosis between syphilitic leg-ulcers and those depending upon varicose veins is founded upon the points already well known, the author holding that a proper determination is usually easy, an opinion with which many experienced surgeons will not agree. A chapter is devoted to bone-syphilis, with a few paragraphs upon affections of the tendons, bursæ, and ligaments. Affections of the circulatory system are very briefly considered. In discussing syphilis of the heart the author justly states that there are no sharp diagnostic symptoms, but that whenever a person with previous syphilis shows the signs of heart-disease an active antisiphilitic course of treatment should be instituted. He does not mention that sudden death is a very frequent termination of these cases. The fibroid induration of the cavernous bodies he classes as specific, although Mauriac has clearly shown that this affection is non-specific in origin.

Syphilis of the nervous system is very briefly considered, yet this chapter will be found unusually complete and accurate. In the section on treatment it is taught that excision of the chancre is useless. The author's therapy represents an intelligent study of all the recognized methods of administering mercury and iodide of potassium. The treatment should be begun only under exceptional circumstances before the appearance of secondaries. This statement is finding fewer followers each year.

The work can be warmly commended as an excellent clinical summary of the knowledge of syphilis as it has been developed by most recent research. Less voluminous than Mauriac's scholarly volumes, more clearly formulated than Finger's book, it should be serviceable both to the specialist and general practitioner.

E. M.

AN AMERICAN TEXT-BOOK OF OBSTETRICS FOR PRACTITIONERS AND STUDENTS. By JAMES C. CAMERON, M.D., EDWARD P. DAVIS, M.D., ROBERT L. DICKINSON, M.D., CHARLES WARRINGTON EARLE, M.D., JAMES H. ETHERIDGE, M.D., HENRY J. GARRIGUES, M.D., BARTON COOKE HIRST, M.D., CHARLES JEWETT, M.D., HOWARD A. KELLY, M.D., RICHARD C. NORRIS, M.D., CHAUNCEY D. PALMER, M.D., THEOPHILUS PARVIN, M.D., GEORGE A. PIERSOL, M.D., EDWARD REYNOLDS, M.D., HENRY SCHWARZ, M.D., RICHARD C. NORRIS, M.D., Editor; ROBERT L. DICKINSON, M.D., Art Editor. With nearly 900 colored and half-tone illustrations. 8vo., pp. 1000. Philadelphia: W. B. Saunders, 1895.

A *Text-book of Obstetrics* by sixteen different authors has reached us, and we believe the nature of the work demands more than a passing notice. Practitioners and students of medicine possess one or more text-books of obstetrics written by single authors, and many of us several books by the same authors many times revised; but we believe a text-book by more than one individual has not heretofore appeared, at least during the last decade. The demand for a work which should not only embody the teachings of several prominent American obstetricians, thus reflecting all recent progress made in the theory and practice of obstetrics, but should also be a standard teaching-work for students and a guide for practitioners, has called for the present book. The sixteen different authors selected will be at once recognized by all as well-known and experienced teachers of obstetrics in several of the leading medical schools and hospitals of America.

A welcome and necessary feature of the present *Text-book*, not, we are sorry to say, always found in composite publications, is the readily recognizable correlation of the subject-matter, so that although various authors are assigned special themes for discussion, still an attempt, and a generally successful one at that, has been made to preserve throughout the text a logical sequence.

Still another satisfactory feature is that the table of contents indicates the authorship of each section.

Nearly nine hundred colored and half-tone illustrations are to be found in the work, and we cannot pass to a consideration of the text without a word in regard to the accuracy as well as artistic beauty of these illustrations. A little study of the illustrations reveals the fact that most of them are systematically drawn to a scale, uniformity generally being preserved—usually one-third or one-sixth life-size. This will become evident to any reader who, for instance, will take the trouble to compare the conjugatæ veræ of several sagittal sections in the work. The same holds good for the figures. We can only regret that the principle was

not carried further, and, in addition to the full labelling which we find made directly upon the drawings, the scale of reduction from life-size was not also added. Each borrowed engraving has been properly credited, and all have been redrawn, excepting those reproduced from the well-known copper-plates of Hunter and Smellie. We recognize some friends in cuts which come from France through the work of Farabeuf and Varnier, relating to diagnosis and mechanism; from Germany, through Braun, Schroeder, Waldeyer, and Zweifel, regarding accuracy in topographical anatomy; and from Scotland, through the atlases of Hart, Barbour, and Webster, concerning the structure of the pelvic floor. Such a reillustration of an entire department of medicine could only have been rendered possible by an unprecedented liberality on the part of the publisher, and he, together with the art editor, has left nothing undone that could add in the least to the artistic beauty above referred to.

The work comprises some one thousand pages, divided in six sections as follows: I. The Generative Organs, including their Anatomy and Physiology; II. Pregnancy, including its Physiology, Diagnosis, Hygiene, Management, and Pathology; III. Labor, with its Physiology, Conduct, Mechanism, and Dystocia; IV. Puerperium, together with its Physiology, Diagnosis, Management, and Pathology; V. Newborn Infant, its Physiology and Pathology; VI. Obstetric Surgery, with the subheadings of Instrumental Operations, Manual Operations, and Celiotomy for Sepsis in the Childbearing Period.

In Section I., the Generative Organs, we first find the anatomy of the bony pelvis taken up, and, with the aid of the multitude of clear and attractive illustrations, described in a most comprehensive manner. We note that a careful exposition is given us of the pelvic articulations, particularly of that at the pubis, and we naturally look for a more comprehensive description of the position of the pelvis in the skeleton, as effected by the changes in the posture of the body, in view of the claims made in the last two years regarding the effect of increased pelvic inclination upon the *conjugata vera*. We find no reference to Walcher's position at this point, although it is sufficiently described under version on pages 960 and 961. The pelvic floor, its muscles, fascia, vessels, and construction is well cared for, due importance being given, as should be the case in a work upon obstetrics, to the levator ani muscle. The anatomy of the female generative organs, comprising thirty-three pages, five of which are given to the mammary glands, is concise and written in a style for a work destined to be used as a text-book.

Three pages only are assigned to the physiology of these organs, namely, to ovulation and menstruation, and we believe, in view of the abbreviated nature of this section, that Marshall's conclusions, that "the decidua of a particular menstrual period is related, not to the ovum discharged at that period, but to the ovum discharged at the preceding period," is given undue prominence, and is, in fact, not altogether "fully warranted by the more exact data furnished by careful observation."

Eighty-six pages are assigned to the physiology of pregnancy, sixty-two of which are taken up with the development of the embryo and the fetus. Embryology and the formation and relations of the various membranes, embryonic and foetal structures, are fully illustrated by reproductions of sections and by diagrammatic figures. We would have wished that more space were given to the formation and anatomical structure of the various deciduæ, and that the relation of the *constructive*



*stage* (Marshall) of menstruation and the formation of the vera were more forcibly brought out here instead of under the section on Menstruation. A few lines on page 86 dispose of the deciduæ.

Among the Changes in the Maternal Organism Induced by Pregnancy due prominence is given to Webster's recent work in frozen sections. We are glad to notice that when the writer comes to take up the changes produced in the urine by a physiological pregnancy, two pages are given at this point to the albuminuria of pregnancy which is not followed by other symptoms of toxæmia. "If the presence of albumin is but slight, it may be physiological, or, if pathological, no noticeable symptoms may be observed; but if it is considerable and persistent, and if it occurs early in pregnancy, the prognosis is grave. . . . From a clinical standpoint it is ordinarily presumed that when there is albuminuria there is also uræmia to a corresponding degree . . . but certainly these two functional disorders do not hold the same proportion or relation. There may be much albuminuria and but little uræmia, and *vice versa*. It is the degree of the latter disorder that forebodes evil."

We believe the above, in view of modern investigation into the toxæmia of pregnancy, to be sound and safe teaching, and the concluding sentence of this section, where, in order to eliminate from the blood the poisonous material of urea and its products, we are directed first "to act as potently as we can" upon the "compensatory organs of the kidneys," namely, the bowels and the skin, and afterward turn our attention to the control of other symptoms, to be equally reliable teaching for the student or practitioner.

We find under Accidents and Surgical Operations during Pregnancy much evidence drawn from cases and the recent literature of the subject to prove that major operations are generally well borne by the pregnant woman; on the other hand, we are reminded that minor surgical procedures of an irritant character are sometimes, if not often, attended by disastrous results. Thus the case observed by Fancon in the clinic at Strasburg is cited where a neglected sprain demanded cauterization of the ankle-joint. Abortion resulted, followed by septicæmia, necessitating amputation.

Fourteen pages are given to the subject of Abortion, of which but a single page is assigned to its pathology. The use of the tampon is advised in inevitable abortion to control hemorrhage before the fourth month; after that time it is considered dangerous, on account of concealed hemorrhage, and rupturing of the membranes is to be preferred, and that failing, the emptying of the uterus as quickly as possible. In incomplete abortion, in mild cases, in the absence of sepsis, a conservative treatment is allowed, namely, the use of ergot, vaginal douches, and the tampon. In the presence of much pain, hemorrhage, or suspicion of sepsis, complete emptying of the uterus by digital curettage is given the preference to instrumental.

The subject of Extrauterine Pregnancy is clearly and concisely presented, especially the directions regarding the operative treatment. The electrical treatment has, the writer tells us, "deservedly fallen into disrepute," and the injection of fluids into the sac for the purpose of killing the fœtus "is only mentioned to be condemned." The preparations and details for operation before rupture of the sac, at the time of rupture, after rupture, and after calcification, mummification, or suppuration of the fœtus, are set forth in detail, and will prove, we feel sure, a valu-

able portion of the work, and one often to be referred to for aid in these emergencies.

The Conduct of Normal Labor, including antisepsis, practical and working rules for disinfecting in both hospital and private practice, the obstetric examination, including internal and external pelvimetry, the arrangement of the lying-in room in private practice, anæsthesia, the repair of lacerations, is all that can be desired as regards the text, and is in addition fully and beautifully illustrated, with few exceptions, by means of half-tone reproductions of photographs or drawings taken at the bedside. We know of no description of this important subject in any language that can equal the present one for clearness of diction and illustration. The Mechanism of Labor in the following hundred pages is scientifically and clearly set forth.

In the next one hundred and fifty pages the subject of Dystocia is ably discussed. Pelvimetry is here again gone into and illustrated, and the pathological museums of Philadelphia, Washington, and New York have been ransacked for instances of pelvic deformity, which are here reproduced, many of them with their measurements added, which latter renders the illustrations doubly valuable.

Another one hundred and fifty pages are assigned to the Puerperium, which is divided into four sections, as above stated. Under the physiology of the condition due stress is laid upon the fact of the lying-in woman being "eminently predisposed to disease." Webster's recent work in frozen sections of the puerperal woman is given due prominence. We are pleased to note that the diagnosis of the puerperal state, usually omitted in text-books, or only given a few lines, is here given the place it deserves.

The section upon Puerperal Infection is an exhaustive and scientific exposition of the subject. The terms "puerperal fever" and "puerperal septicæmia" are rejected as "both too wide and too narrow for our purposes," and preference is given to that of "puerperal infection," because that term designates pathological conditions occurring during pregnancy, labor, and the puerperium which are both mild and severe, as well as local and general. The text clearly indicates the belief of the writer in the possibility of the transmission of the infecting agent in puerperal infection through the air to a limited extent, and the history of the so-called "epidemic" of puerperal fever at the New York Maternity Hospital following the application of guano to an adjacent garden is quoted in proof of this belief. Statistical tables we find here showing in an interesting and concise manner the revolution in mortality of childbirth that the antiseptic treatment of the condition has wrought. Most explicit directions as regards the preventive treatment are given, and even in this day of antiseptic surgery are well worth a careful perusal. Speaking of apparently normal labor, we find the statement: "No one can foresee—the average general practitioner least of all—what complications may arise during labor. Where an easy delivery has been promised the healthy primipara, it may become necessary to perform version, etc., and . . . the result . . . depends almost entirely on the aseptic or the septic condition of the patient at the time of its performance, taking for granted that the operator uses all antiseptic precautions." Following in italics we find this sentence: "*The doctor and the nurse should know that they jeopardize their patient's life by introducing into her vagina a finger that is not disinfected.*" The curative treatment is

admitted to be much less effective than the preventive, and the various procedures to be carried out after infection has occurred are carefully stated.

The concluding section of the work is that upon Obstetric Surgery, which includes a timely and interesting discussion of the subject of Cœliotomy for Sepsis in the Childbearing Period. We regret that in a work of the present character that no mention is made, if only to condemn it, of manual dilatation of the os as an obstetric surgical procedure; only once (page 596, under *Placenta Prævia*) do we find *accouchement forcé* mentioned. Instrumental dilatation of the uterus by means of Hegar's, Tarnier's, Barnes's, and Champetier de Ribes's dilators is fully described and illustrated. Incision of the parturient cervix, multiple or deep, we fail to find reference to, and perhaps it is properly omitted, in view of the fact that our data are not yet sufficient to warrant positive conclusions.

The obstetrician and the general practitioner will find this book not only a pleasant and interesting volume, but the most valuable of its kind, both on account of the wide experience of the several authors and because of the attractiveness and accuracy of its illustrations. Its value to the student is enhanced, in addition to the above, because of the systematic avoidance of conflicting statements and the fulness and clearness with which directions for treatment are stated. As an authority, as a book of reference, as a "working-book" for the student or practitioner, we commend it because we believe there is no better.

J. C. E.

A TEXT-BOOK OF PRACTICAL MEDICINE, DESIGNED FOR THE USE OF STUDENTS AND PRACTITIONERS OF MEDICINE. By ALFRED L. LOOMIS, M.D., LL.D. Eleventh edition. New York: William Wood & Co., 1895.

A TEXT-BOOK that has gone through ten editions in as many years is a rare thing in these days, when competitors issue from the press at the rate of about one a month. When the first edition of the work before us appeared the field was not so full, yet it kept its place, and the appearance of this eleventh edition shows a determination to maintain its position. At least we assume that this is the reason for its appearance, and that it is not issued as a memorial to its author.

It might seem that criticism of such a work would be superfluous, but the critic has semi-historical duties to perform. He knows that text-books on the practice of medicine have their fates, like others, and so furnish striking but melancholy evidences of the progress of our art.

The plan of Dr. Loomis's book will rarely be followed in future works on practice. The introductory chapters on General Pathology and Bacteriology may have been necessary in former days, but do not now serve any useful purpose.

In reading the subsequent chapters it is easy to find the reason for the popularity of this work. That is due, we think, to the air of candor and sincerity pervading all its pages. Encyclopædic knowledge is not set forth, but in almost every chapter it is made clear that the author had observed carefully, had thought earnestly for himself, and so had arrived at convictions of original and real value. All this is set forth in a plain and simple way, so that the student sees clear pictures of disease to store



in his memory, and the physician finds in positive terms what he formerly but dimly grasped. Such books are read by students of medical literature long after the mere compilations are forgotten. The descriptions of signs and symptoms are painstaking and on the whole accurate; the directions for treatment minute and careful, revealing the skilled practical therapist. Remedies are recommended confidently, at times freely, but never without a conviction as to their value. On the other hand, drugs found useless by the author are so described. The style is usually clear and plain. At times a semi-didactic manner is adopted, and repetition, so useful in oral instruction, is sometimes used with good effect, as in the chapter on Pneumonia, in which the panting respiration is mentioned several times. Occasionally the statements are unintelligible, as when the author tells us (p. 265) that "most patients do best on a diet free from hydrocarbons," or that for patients with gastric ulcer rest in bed for three months is necessary. "Spiliform" bacilli (p. 29) are new to us; the statement (p. 332) "Iceland is the only country in which the hæmatoids are not found" does not convey any information; nor can we imagine what is meant by the following (p. 818): "An organized ferment, *bacterium* or *tarnea* (which develops to a certain point in a proper medium and then suddenly ceases its career), has been found in blood and breath and in glycerin on which children with measles have breathed."

The classification is in some respects peculiar. Basedow's disease is placed among diseases of the heart; dengue is considered between the sections on Acute and Chronic Malaria; there is a chapter on "Gastric Dyspepsia," in which no good reasons are given for the use of such a term. The work shows strange survivals in the sections on Pathology. It is said (p. 265) that "the varieties of cancer of the stomach are scirrhus, medullary, and epithelial. Any one may undergo colloid degeneration and thus appear as either villous or melanotic cancer." The introduction to the section on malaria shows the influence of modern investigations. The statement, however, that "forms of malarial parasites ripe for segmentation are not often seen in the blood from the finger, except in malignant cases," is not correct. The pathology of malarial pigmentation as here given is purely fanciful, and all through the discussion of malarial disease ancient and long-abandoned views are advanced, to the exclusion of modern and exact knowledge now so accessible.

In the sections on Diagnosis newer methods are rarely mentioned. The stomach-pump[] is recommended several times, but the systematic use of the stomach-tube in diagnosis and the chemical and other examinations of the stomach-contents are not referred to. The modern methods of examining the blood are not alluded to.

The remarks on treatment are for the most part commendable. The indications for and method of cold bathing in typhoid fever are not such as should be followed. The section on Diphtheria, which is said to have been revised by a specialist, has a non-committal note on the serum-treatment which is not only antiquated, but all the more aggravating because of the evident room for an adequate statement. The assertion that "Loreta's operation of digital divulsion" of the pylorus "has been followed by quite invariably favorable results" (p. 283) is very remarkable, the result in a large percentage of cases being death, and in many others failure.

The section on Nervous Diseases, also revised by a specialist, makes no mention of the neuron doctrine, while the description of "system-diseases" is said to be recent.

The work is evidently no longer useful as a text-book. It is to be read rather for what it was than what it is; as a picture of the practice of the past rather than a guide to the present. Some of the chapters, as those on Smallpox, Typhus Fever, and Relapsing Fever, can long be referred to by reason of the fidelity of their descriptions of disease.

It is to be regretted that the mechanical execution of the work is not more adapted to honor the author whose loss the profession as a whole, as well as the numerous readers of former editions, will long deplore. The plates are badly battered, the cuts worn, and the proof-reading wretched. An enumeration of the inexcusable typographical errors would far exceed the limits of an ordinary review. G. D.

A MANUAL OF THE MODERN THEORY AND TECHNIQUE OF SURGICAL ASEPSIS. By CARL BECK, M.D. Philadelphia: W. B. Saunders, 1895.

THIS little volume is unlike anything hitherto published in that it combines the practical and the theoretical in the treatment of wounds. There are chapters on the Influence of Microbes, the Importance of Asepsis, Means of Disinfection, Prophylactic Disinfection, Disinfection of Instruments and Dressings, Aseptic Open-wound Treatment, Renewal of Dressings, Technique of an Aseptic Operation, Aseptic Injection, and Asepsis in Private Practice.

The historical and past traditions are so mingled with the modern methods advocated that unless one is thoroughly conversant with the subject he is likely to be confused.

The chapter on the Renewal of Dressings is an excellent one. The apparently unimportant details of the book will be found by the house-surgeons of our hospitals and the medical student through the last of his course to be of a very great value. It is difficult to find, except in this little manual, these details of treatment carefully dealt with.

C. L. S.

THE TREATMENT OF WOUNDS, ULCERS, AND ABSCESES. By W. WATSON CHEYNE, F.R.S. Philadelphia: Lea Bros. & Co., 1895.

As the title indicates, the author discusses only a portion of the subject of the treatment of wounds in this most interestingly written book. The idea suggested at page 4, that there is in the healing process anything resembling an inflammatory process, is quite at variance with the most advanced pathology of repair.

The book is written entertainingly, and is of great value to the student in that it considers questions which are constantly coming up to him during his service as dresser and hospital interne.

There is comparatively little new for the surgeon in active practice.

C. L. S.

# PROGRESS OF MEDICAL SCIENCE.

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## THERAPEUTICS.

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UNDER THE CHARGE OF

REYNOLD W. WILCOX, M.A., M.D., LL.D.,

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MEDICAL SCHOOL AND HOSPITAL; VISITING PHYSICIAN TO ST. MARK'S HOSPITAL.

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## ANTIPHTHISIN.

DR. CHARLES DENISON does not consider that this remedy is absolutely perfect, nor the technique of its administration as unquestionably determined. It is made directly from the ten-times-concentrated culture-fluid of tubercle-bacilli, the toxic principles which tuberculin contains being excluded. It is thus claimed to represent the probable germicidal property of tuberculin, as much as exists in an equal quantity of the latter, and its special value depends upon the fact that a larger dosage is allowable without the injurious toxic effects to be expected from large doses of tuberculin. The germicidal and healing effect seems to have been shown, in most of the cases, in the lessening of the number of germs found to the field, and their degenerative or incomplete forms thrown off when good-sized doses were reached, as well as in the clearing-up of consolidated or infiltrated tubercular lung-tissue. The substance is not wholly without reactive effects, nor are we quite sure of its exact constituents and their constancy. There is probably a stimulating effect, and that produces an increased leucocytosis. It may be that a limit to the good which this remedy may accomplish in a given case might perhaps be assumed to have been temporarily reached when this process is found to be overtaxed or to have been arrested, as shown by the paucity of leucocytes, and these swollen or granular when demonstrated by microscopic examination with high-power lenses. If this supposition is correct, it may be that we may anticipate greater success by combining or alternating with it something else which will foster or increase leucocytosis.—*New York Medical Record*, 1895, No. 1289, p. 78.

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## PARACHLOROPHENOL.

DR. CH. GIRARD states that this drug is crystalline at ordinary temperature, has an odor similar to phenol, and is very soluble in alcohol and ether,



although but slightly in distilled water, which takes up only 1.3 per cent. With the addition of a small quantity of alcohol a 2 per cent. solution can be obtained. It coagulates albumin, as does phenol, but not completely. According to Karpow, in 2 per cent. solution it is a little less energetic than corrosive sublimate one *per mille* against the spores of anthrax, but is incomparably more active than 5 per cent. solutions of phenol or cresol. It is much less poisonous than the substances above mentioned. The urine of the animals used for experiment, even exposed to the air, remained for a month without odor or any sign of putrefaction, the coloration only becoming more pronounced. From the experience of this antiseptic in about two hundred operations the following conclusions are reached: In from 1 to 2 per cent. solutions it is the most energetic antiseptic which organic chemistry furnishes; it is of definite chemical combination, and in solution is colorless, or almost so, and its odor is less disagreeable than other phenol or cresol derivatives; it can be used for the disinfection of the hands and instruments as well as the usual antiseptics.—*Revue Médicale de la Suisse Romande*, 1895, No. 7, 365.

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#### COCAINE-ANÆSTHESIA.

M. ANDRÉ LAPOINTE states that safety demands that local anæsthesia by means of this drug should be produced only when the following rules are observed: 1. Only fresh 1 per cent. solutions prepared aseptically should be used. 2. A sterilized syringe of 15 minims capacity is used. 3. The maximum dose of the alkaloid is  $2\frac{1}{2}$  grains. 4. The patient should be operated upon in the recumbent position. 5. The operation should be commenced not less than five minutes after the last subcutaneous injection. 6. If there is need, the anæsthesia should be made upon several superimposed planes. [This refers to deep-seated abscesses, tumors, and ligations.] The vaso-constrictor power of the drug well explains the cerebral anæmia and syncope which are encountered in cases of poisoning.—*La Presse Médicale*, 1895, No. 35, p. 273.

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#### STATIC ELECTRICITY.

DR. JULIUS ALTHAUS believes that this form of electricity has again found favor, and is a very useful addition to the electric instrumentarium. The modern machines yield a plentiful supply of electricity independently of the weather. It is chiefly used as a dry bath, the patient being charged while on an insulating-stool; at the Salpêtrière with positive electricity several hours a day. It may be also applied by drawing sparks from round conductors; as the electric wind, or breeze, or douche, when a pointed conductor is approached to those which are intended to be acted upon; or a metallic cap, connected with a conductor, is held at a certain distance from the head. A discharge intermediate between the wind and spark is produced by the so-called "electric aigrette" when a blunt metallic point or piece of wood is approached to the patient's body. This is particularly useful when a sensitive part is to be acted upon or as preparatory to stronger treatment of timid patients. A "static current" has been employed by passing an uninsulated ball rapidly over the clothing of the patient. These different methods can produce a mixture of stimulant and sedative effects

upon the system, which may be utilized in the treatment of certain neuroses, as hysteria, hysteroepilepsy, insomnia, and obstinate forms of neuralgia and spasm. Morton has used the "static current" in locomotor ataxia and other degenerations of the spinal cord with apparent benefit. As ozone or electrified oxygen is developed during the action of the Franklinic machine, the patient may be made to inhale it by holding an insulated disk with a number of points at some distance from his mouth. This proceeding has been found to be useful in certain forms of anæmia and spasmodic asthma. —*Medical Press and Circular*, 1895, No. 2924, p. 533.

#### ACUTE AND CHRONIC COPPER-POISONING.

HERR WILHELM FILEHNE notes the many opportunities for the ingestion of this metal, which gives rise to chronic poisoning. In guinea-pigs there were observed loss of body-weight, particularly anæmia of all tissues and organs, swollen spleen, small and fatty liver, anæmic kidneys, pale gastric mucous membrane, the intestine, beyond pallor and possibly some swelling of the plaques, normal; in doses which do not give rise to emesis, copper in the combination with potassium tartrate may be dangerous to health, and, as this double salt may contaminate wines, this communication becomes important. In 1889 Dauscher reported a case of poisoning from this source in which the symptoms were gastric pain, fainting, tenesmus, muscular twitching, and, later, jaundice; the last two symptoms being especially significant of the cause of the poisoning. Further observations are necessary to determine the amount of the metal which will give rise to poisonous symptoms.—*Deutsche medicinische Wochenschrift*, 1895, No. 19, S. 297.

#### ETHER-ANÆSTHESIA.

M. CHAPUT states that (1) it is less dangerous than chloroform; deaths from the former 1 in 13,000, from the latter 1 in 2000. (2) It can be produced in from four to six minutes, therefore being more rapid. (3) It is very easy, and thus can be intrusted to a very ignorant person. On the contrary, a good chloroformist is very rare. (4) It strengthens the heart-beat and does not conduce to shock. (5) It has less effect upon the kidneys than does chloroform. (6) It causes vomiting only exceptionally. (7) The patients awake easily and quickly and are much less depressed. Ether is contra-indicated in acute or chronic affections of the respiratory apparatus, in operations upon the face or in those which necessitate tracheotomy, and in cerebral surgery. The mask of Wanschier is preferred to that of Julliard in that it is smaller and less cumbersome, allows inspection of the face and eyes, and easily graduates the amount of air.—*Journal des Praticiens*, 1895, No. 19, p. 299.

M. PONCET has used ether during twenty-five years in from twenty-three to twenty-five thousand cases with but a single death; a child who suffered from a cardiac lesion. The immediate accident with ether-narcosis is suffocation, but it is one which is amenable to treatment either by artificial respiration or tracheotomy; the last he has resorted to with success four times. The contraindications are early and old age, both for the same reason—the

liability to pulmonary catarrh. Nor should ether be used in operations upon the face or at night (danger of fire). Mixed anæsthesia—that is, chloroform preceded by injections of morphine and atropine—has been discarded because of its dangers. With ether the dangers are easily detected and combated; with chloroform the reverse is true.

M. CHAMPIONNIÈRE states that ether can be annoying to the surgeon in that he may exhale its vapor for twenty-four hours. The anæsthesia is less perfect, the after-vomiting is as frequent, and the secondary excitement more persistent, and it gives rise to great thirst. On the other hand, the dangers are less grave, its elimination easier, and the anæsthesia is quicker.

M. QUENU employs ether for short operations and for patients with broken-down nervous system.—*Journal des Praticiens*, 1895, No. 22, p. 346.

[While in the main the views expressed above are correct, we are strongly of the opinion that renal disease is a valid contraindication to the use of ether, and that in this instance chloroform is preferable.—R. W. W.]

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#### SOME NEW VASO-DILATORS.

DR. J. B. BRADBURY has investigated erythrol and mannitol nitrates; also those of the sugars: dextrose, levulose, and saccharose nitrates. These are less soluble than other nitrates, and therefore have a correspondingly weaker effect, but their action is more prolonged. Considering the first two named above, their therapeutic indications can be given as chiefly when the heart is laboring under increased work imposed upon it by contracted arteries. The difficulty hitherto has been not so much to reduce arterial tension as to keep it constantly below a certain level. Both nitroglycerin and sodium nitrite have been used, but their administration has been attended with some inconvenience, notably that their action is so transient that the doses must be repeated at two-hours' intervals in order to produce continuous low tension. On the other hand, with the substances above named, the tension is not brought so low, but the reduction is of longer duration and the pressure is less liable to fluctuation. Further, they are free from poisonous properties, a quality readily explained by their slight solubility. The conditions under which these remedies may be used are cardiac pain, chronic Bright's disease, aneurism, Raynaud's disease, dyspnoea, headache, nervous diseases, as migraine and neuralgia, and various forms of poisoning, as from opium and coal-gas, vomiting from pregnancy and sea-sickness, lenteric diarrhoea, diabetes mellitus, and hysterical paralyses. The dose of the solid organic nitrate may be taken as one grain, but more may be given if necessary in pill, tablet, or in alcoholic solution. The latter is preferred; of the erythrol nitrate, 1 to 60 aqueous solution, in drachm doses. Of the mannitol nitrate, 1 to 100 aqueous solution, in dose of from one and a half to two drachms. Both solutions, thus made, are stable and free from irritating properties.—*The Lancet*, 1895, No. 3768, p. 1205.

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#### THE PHARMACOLOGY OF THE IPECACUANHA-ALKALOIDS.

DR. ROBERT B. WILD, from his observation, sums up the action of cephaeline and emetine hydrochlorides as follows: Both possess a powerful emetic



action; the emetic dose of the latter was, however, about double that of the former. In non-emetic doses the degree of nausea produced by cephaline was also about double that produced by emetine; *e. g.*, the intensity and duration of nausea following cephaline were much the same as that following double the amount of emetine. Both alkaloids lowered arterial tension, and little difference was apparent in small doses, but the depression produced by cephaline was less than that produced by the larger emetic dose of emetine; cephaline appeared, therefore, to be distinctly preferable where a non-depressing emetic was desired. Both alkaloids caused contraction of the bloodvessels after destruction of the brain and spinal cord, but emetine was distinctly more active than cephaline; 1 in 10,000 of the latter produced little if any effect, while 1 in 20,000 of emetine was followed by marked contraction. On the heart no appreciable difference could be made out, both produced slowing, weakening, and diastolic arrest of the isolated organ; recovery was easily effected when the poison was removed. It is doubtful whether the drugs in the doses administered to man could affect the heart directly, but the fact that 1 in 20,000 caused diastolic arrest in forty-six minutes renders caution necessary in giving large doses of the alkaloids. Both acted as muscle-poisons, but cephaline had the greater toxic power, and also caused irritation of the motor nerve-endings and contracture. On the secretions, salivation was well marked whenever there was nausea. Emetine caused a flow of watery mucus from the nasal mucous membrane when a full dose was given; this was not noticed after cephaline. It is possible that the expectorant action of ipecacuanha is due to a similar action of emetine upon the other portions of the respiratory mucous membrane. Intestinal peristalsis and a loose motion at times followed the administration of either alkaloid; there was never any marked purgation. No effect was noticed upon the secretions of the skin, nor upon the amount of urine. Assuming the view that emetine is methyl-cephaline to be correct, the chief effect of the addition of the methyl group was to reduce markedly the action of the compound upon the convulsive or vomiting centre in the medulla oblongata, and also to diminish the irritating effect on motor nerve-endings. The methyl compound had, on the other hand, a more powerful action as a local vaso-constrictor. It seems probable that in cephaline we have a powerful and certain emetic, singularly free from depressing effects when given in doses of from one-twelfth to one-sixth of a grain; its action is, however, too slow to prove of much service in cases of poisoning, but in all other cases where emesis is desired it appears well worthy of trial. In acute catarrhal and febrile conditions as an expectorant, and for all the uses of ipecacuanha when vomiting is not desired, emetine in small doses seems likely to prove of considerable value, and also as an emetic in larger doses, from one-sixth to one-third of a grain, when a more depressing action is required. The powerful local constricting effect upon bloodvessels may also prove useful in hyperæmic and inflammatory conditions.—*The Lancet*, 1895, No. 3769, p. 1274.

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#### ANTI-STREPTOCOCCUS SERUM.

DR. GEORGE G. VAN SCHAICK reviews the literature and states that the immunization of animals by means of toxins taken from ordinary cultures

have hitherto given variable and rather uncertain results. The use of exceedingly virulent cultures has enabled us to immunize animals and obtain an antitoxic serum of great activity. This streptococcus antitoxin possesses a high preventive power in animals. The frequent association of diphtheria with streptococcal infection has suggested to French experimenters the propriety of preparing a serum having antitoxic properties against both the [Klebs-]Loeffler bacillus and the streptococcus by immunizing the same animal against both poisons. Further, it has been shown that animals which had already been immunized against diphtheria possess a remarkable degree of tolerance against streptococcal infection. Marmorek has treated with streptococcus-antitoxin 411 patients suffering from streptococcal infection in various forms, with a mortality of 34 per cent. In erysipelas, with sufficient dose, relief was felt in from five to twelve hours after the administration of the first injection, headache and muscular pains are lessened, and sleep is restored, the temperature is lowered more or less rapidly. If it should not decrease within twenty-four hours, the injection must be repeated. Two or three hours after the injection there is a rise of temperature, which is again rapidly lowered, reaching the normal within twenty-four hours. When the intervention is practised early, a single injection seems to abort the disease. If the disease is further advanced, the fever disappears more slowly, and proves especially tenacious in ambulant erysipelas, usually necessitating repeated injections. The local state becomes ameliorated more or less rapidly according to the severity of the infection, the time at which the injection is made, and the quantity of serum employed. In some patients seen at the beginning, the redness disappeared, and in three hours the desquamation started. The latter occurs rapidly and in large shreds. Suppuration in the neighborhood of the disease rarely occurs. Albuminuria, frequent in this disease, is not seen in those patients who receive the serum at the inception of the disease, and in those who have been treated twenty-four to forty-eight hours after the beginning it disappears very rapidly. Two forms of erythema have been occasionally observed, one is urticarial and the other resembles purpura, but is not associated with any febrile movement.—*Therapeutic Review*, 1895, No. 3, p. 74.

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#### THE TREATMENT OF DIABETES.

DR. J. BLAKE WHITE inclines to the conviction that diabetes should be classed among the neuroses, and that its varied phenomena result by reflexes from the nervous system, just as shock may temporarily arrest the secretion of urine. The disease obviously arises in the sympathetic chain which controls the secretory functions of the kidneys. A judicious restriction of diet should be insisted upon, and fats in the form of butter, cream, and fresh milk should be permitted, and sometimes it is advisable to give cod-liver oil, the form of emulsion being best suited to the pancreatic complication of the disease. As an assimilable form of saccharine substance, levulose has been recommended. The saline purgative and alkaline non-purgative waters are serviceable to diabetics; the former by reducing saccharine supply by removing from the intestines ingested food before it has had time to be absorbed and furnish the liver with material for the manufacture of sugar; the

latter act as any alkaline medicament in emulsifying fatty foods and rendering them easy of digestion. From internal antiseptics most beneficial results have been obtained, the remedy most commended being benzoyl-guaiacol given in capsules, commencing with a moderate dose of a grain or two and gradually increasing it to ten or fifteen grains thrice daily. This drug apparently stimulates the nerve-centres; it increases the appetite; it lowers the specific gravity of the urine; it controls the excretion of urine; and, lastly, it modifies the sugar-formation, thus lessening the amount excreted. In addition, the use of lithium carbonate and Fowler's solution gives the best results.—*American Medico-Surgical Bulletin*, 1895, No. 23, p. 1413.

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#### CONCERNING DIAPHORETIC METHODS.

DR. KARL DEHIO prefers the hot-air bath, administered in bed, in the manner familiar in American hospitals, because it brings about: (1) Extensive change in the circulation and distribution of the blood with lowering of blood-pressure. (2) There is an energetic abstraction of water through increase of perspiration. (3) There is a marked increase of tissue-change and increased expenditure of body-substance. The indications for its use are anasarca from renal disease, either post-scarlatinal or acute, acute anæmia, and chlorosis.—*St. Petersburger medicinische Wochenschrift*, 1895, No. 44, S. 373.

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#### PHENACETIN-POISONING.

DR. G. KRÖNIG reports a fatal case. For occipital headache a seventeen-year-old printer's assistant received five fifteen-grain phenacetin-powders, not more than two to be used in a day. After an evening-dose vomiting commenced, then were noticed great weakness and a bluish-gray coloration of face and lips. The temperature was 102.2° F., the pupils were of medium size, the pulse weak, and the patient complained of headache, vomiting, and diarrhœa. The urine was of chocolate color, the conjunctivæ slightly jaundiced. General icterus followed, and cyanosis of lips, ears, hands, and feet. Urine obtained by catheter was thick, dark reddish-brown in color, containing masses of almost pure blood. Death followed two days after the ingestion of the remedy. As the patient was septic from a purulent otitis, a necropsy was necessary to show that death was due to the drug. The diagnosis reached by this means was stated as universal methæmoglobinæmia, although the patient within the preceding three weeks had taken four similar doses with no apparent ill effects.—*Berliner klinische Wochenschrift*, 1895, No. 46, S. 998.

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#### THE HÆMOSTATIC PROPERTIES OF ANTIPYRIN.

DR. H. HUCHARD notes that as early as 1884 these properties had been noted, and it was suggested by Arduin that the drug might be used for the same purposes as iron perchloride and ergot. Its hæmostatic effects are powerful and rapid. In epistaxis a simple tampon moistened in a solution of the drug (1 to 5 or 1 to 2) is usually sufficient. In more extensive hemorrhages, hot irrigations with a 4 per cent. solution or even insufflations of the powdered drug are useful. For hemorrhages after ablation of polypi or ex-



traction of teeth these methods are applicable. In uterine hemorrhages, due to different causes, large irrigations with a 5 per cent. solution should be terminated by the application to the neck of the uterus of a tampon wet with the same solution. In hemorrhage due to endometritis fungosa, equal parts of salol and antipyrin are melted at the fusion-point of salol, which gives a brown, syrupy liquid, and this liquid is used to moisten a tampon which can be placed into the uterine neck, a speculum being used, and over it a few other tampons. After amygdalotomy moistened tampons are efficacious. For hæmoptysis, inhalations or sprays of a 1 per cent. solution have been effectual when other means, including subcutaneous injections of ergotin, have failed. For open wounds a solution or a gauze impregnated with the powder coagulates the blood, which resists for a long time decomposition, because of the antiseptic and cicatrizing properties of the drug.—*Journal des Praticiens*, 1895, 2e semestre, No. 19, p. 289.

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#### THE ABSORPTION OF THE ALBUMINOIDS AND FATS OF A NUTRITIVE ENEMA.

DR. R. LÉPINE, reviewing the physiological literature, acknowledges that the question, whether absorption takes place in the large or small intestine, remains open, because the ingenious hypothesis of Grützner, that there is a retrograde transportation of fine alimentary particles without visible antiperistalsis, has not yet been established. If this should fail of proof, it is strongly probable that some of a nutritive injection could pass through the ileocæcal valve, and thus would be partly explained the fact that a patient can live and keep his weight entirely upon rectal enemata, for all that the large intestine does not show digestive phenomena which are hardly appreciable. Physiological observation shows that the ileocæcal valve is permeable, and it is only necessary for nutritive substances to penetrate a certain distance into the ileum to meet with digestive juices which can change them and render them absorbable.—*La Semaine Médicale*, 1895, No. 45, p. 389.

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#### IZAL.

MR. SHERIDAN DELÉPINE makes a laboratory-report upon this compound, which is comparatively insoluble and non-volatile at the ordinary temperature. It can be freely administered internally, used over extensive wounds, or injected under the skin without bad effects, and, finally, does not damage surgical instruments. The organisms upon which he has used this drug are: (1) bacillus tuberculosis (hominis); (2) bacillus coli communis; (3) staphylococcus pyogenes aureus; (4) bacillus anthracis (sporing-stage). Summing up the results of his observations he concludes that when diluted with 100 or even 200 parts of water it is a powerful and reliable antiseptic when contact of a sufficient length of time is secured. As an antiseptic it is more powerful than carbolic acid, and there is little doubt that it possesses immense advantages over it in many directions.—*The Medical Chronicle*, 1895, No. 6, p. 434.

[Izal is said to be a by-product obtained in the process of coke-formation. It is also known as Thorncliffe disinfectant.—R. W. W.]

MEDICINE.

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UNDER THE CHARGE OF

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AND

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HEMIOPIA FROM INJURY OF THE OCCIPITAL LOBE.

Cases of this kind are rare enough to make the following, reported by MEY (*Centralblatt für innere Med.*, 1895, No. 42), of unusual interest. A mason, sixteen years of age, fell from the height of two metres and struck the back of his head on the point of a trowel, causing a complicated fracture, with depression of a fragment of bone, a wound in the transverse sinus, and bruising the surface of the brain. The bone-fragments were chiselled out and the wound tamponed. The defect in the bone, the size of a "thaler," was in the right parietal region, at the junction of that bone with the occipital and temporal, and just above the transverse sinus, corresponding to the anterior part of the right occipital lobe. The patient recovered from the injury, but within a few days began to have severe headaches with diminution of hearing and vision. The deafness disappeared in two weeks, but the difficulty in vision remained. The patient could only see with difficulty, soon tired on attempting to read, and the dimness of vision to the left of the patient was so marked that he had uncertain gait and dizziness. Examination showed complete absence of the left sides of the visual field, with concentric diminution of the right halves. The eye-ground was normal. The hemiopia remained, the diminution of the right side continued a short time and then gradually disappeared. The patient became able to walk and read. The transitory deafness and diminution of the field of vision are ascribed by the author to the circulatory disturbances following the fracture and the thrombosis of the transverse sinus, the hemiopia to the injury of the right occipital lobe, as produced experimentally by Munk and observed in cases of disease or injury since then.

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THE DIAGNOSTIC VALUE OF TRANSILLUMINATION OF THE STOMACH.

MEINERT (*Centralblatt für innere Med.*, 1895, No. 44) calls attention to the errors attending the diagnostic use of illumination through the stomach, for which MARTIUS and his pupil MELTZING have claimed more than most clinicians are willing to grant. As Meinert says, Meltzing failed to demonstrate that the figures produced by putting an incandescent lamp in the stomach are due to the shape, size, and position of the organ, rather than to the position of the lamp itself. Comparative tests were made by distending the stomachs of a number of patients, locating them by palpation, and measuring their capacity, then by illuminating them according to the method

of Meltzing. The results of these experiments demonstrate the truth of Meinert's contention, that the area of light shown by the lamp at the end of the sound is affected by the translucency of the intestines at the time, the intensity of the light, and the distance of the lamp from the abdominal wall. The diagnostic value of the procedure is therefore slight. Tumors in the splenic region, dislocation of the spleen, and the topographic relation of many palpable tumors of the stomach and its vicinity may be demonstrated by it, but the position, size, and form of the stomach are more likely to be wrongly than correctly decided by its means.

#### INTRAUTERINE TYPHOID INFECTION.

FREUND and LEVY (*Berliner klin. Wochenschrift*, 1895, No. 25) report the case of a pregnant woman in the middle of her gestation who had typhoid fever and aborted in the beginning of defervescence. The fœtus died as soon as the cord was cut. Twenty minutes later cultures were made from the fœtal organs with all necessary precautions, and in course of time colonies grew from the splenic and placental blood having all the characteristics of the typhoid bacilli. The fœtus had an enlarged and soft spleen, otherwise no abnormalities.

#### THE ALTERNATION OF DYSPNŒA AND VENOUS CONGESTION IN HEART-DISEASE.

ZERNER (*Wiener med. Blätter*, 1895, Nos. 7 and 8) calls attention to the fact that in cases of heart-disease the symptom of dyspnœa disappears when œdema and other evidences of venous congestion occur. This is explained by the theory of von Basch, according to which the causes of dyspnœa are distinct from those of stasis of the general circulation. The dyspnœa is the expression of pulmonary stasis from insufficiency of the left ventricle; whereas the stasis of the greater circulation is due to weakness of the right ventricle. If, during congestion of the lungs, stasis occurs in the greater circulation—i. e., distal from the right ventricle—the amount of blood in the lungs must lessen and the existing dyspnœa decrease.

#### THE EFFECT OF THYROID-FEEDING, ESPECIALLY IN GRAVES'S DISEASE.

SCHOLZ (*Centralblatt für innere Med.*, 1895, Nos. 43 and 44) has recently carried out some interesting observations on this subject which are of great importance on account of their bearing on the pathology of Graves's disease. Owing to the incompleteness of the observations only a few deductions can be given here. It seems established that in adults with normal thyroids the ingestion of "dead" thyroid causes a less marked effect on the excretion of nitrogen and on the weight than in myxœdema and obesity. In these respects a patient with Graves's disease reacted like a healthy person. There was diuresis, but a scarcely perceptible increase in the excretion of nitrogen in the urine. The weight increased to the extent of three kilogrammes in a week. The excretion of phosphoric acid in the urine was not increased by the use of thyroid-tablets, but there was an increased excretion of phosphoric acid in the stools amounting to tenfold the normal in the patient with Graves's



disease, as compared with an increase of 25 per cent. in a healthy person. This agrees with Roos, who found that in healthy dogs feeding with thyroid caused an increased excretion of nitrogen, sodium chloride, and phosphoric acid. If the animals are deprived of their thyroid glands, the effect of the substance on the excretion of nitrogen and chlorine is more marked than in healthy animals. The conclusion is, therefore, that the thyroid gland has an important influence on the metabolism of phosphoric acid. The following hypothesis is suggested: The failure of the function of the thyroid causes retention of phosphoric acid, while the morbidly increased activity, as in Graves's disease, caused increased excretion. In view of this and corresponding to it the beneficial results claimed by Kocher from the internal use of sodium phosphate are of interest.

#### GRAVES'S DISEASE AND SCLERODERMA.

SINGER (*Berliner klin. Wochenschrift*, 1895, No. 11) reports a case of scleroderma in which the right half of the thyroid gland was found greatly atrophied during life, and post mortem both lobes showed marked sclerotic changes. This observation led the author to formulate a new theory of the nature of scleroderma. The combination of the latter disease with Graves's disease has been noticed especially by Leube, Kahler, and Jeanselme. The early changes in scleroderma have a great resemblance physically to those of myxœdema, and in both the subjective symptoms—formication, coldness, pain—are much the same. Graves's disease and myxœdema may be associated, and that both of them are due to changes in the thyroid becomes daily more certain. Singer suggests, therefore, that all three of these diseases are related, though he leaves open the question whether the changes in the function of the thyroid are primary or secondary. Although the question must be settled by anatomical and clinical observations, it opens a field for therapeutic experiments in the treatment of scleroderma with thyroid-preparations.

#### THE ETIOLOGY OF GENERAL PARALYSIS.

HIRSCHL (*Berliner klin. Wochenschrift*, 1895, No. 45) has obtained the following results and conclusions from an analysis of 200 cases. In 56 per cent. of cases there was a clear history of syphilis, in 25 per cent. it was probable, and in only 19 per cent. a history of syphilis could not be discovered. Soft chancres were not used in this investigation as proving the existence of syphilis. In 78 cases in which the time of infection could be fixed, the interval between that and the appearance of paralysis varied from two to twenty-nine years. The author thinks the cause of general paralysis is a single one, on account of the similarity of the symptoms and of the anatomic process, the latter being a diffuse encephalitis and periencephalitis. The question whether this cause is syphilis requires some explanation of the 19 per cent. of cases with negative histories. This the author disposed of by taking the histories of 63 cases with late syphilitic lesions and finding that in only 54 per cent. was there a history of syphilitic infection, in 9.5 per cent. it was doubtful, in 36.5 there was none at all. The anatomical changes in paresis were compared with those of syphilis, especially with the interstitial hepatitis of late syphilis. Finally, some of the symptoms of paresis were found

to occur in syphilis, such as reflex immobility of the pupil, double vision, optic atrophy, ophthalmoplegia, and tabes; the symptoms of general paralysis were claimed to be favorably influenced by antisyphilitic treatment and the prevalence of the two diseases was adduced to prove further their relationship. The paper shows what can be done with statistics.

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#### THYROIDISM.

LANZ (*Correspondenzblatt für Schweizer Aerzte*, 1895, No. 22) has recently called attention to the need of a more precise understanding of the effects of the ingestion of thyroid gland and its preparations. Symptoms of intoxication due to the gland itself may be expressed, after many analogies, as thyroidism. Experiments show that different preparations vary much in their effects. Fresh glands are much less toxic than various preparations, so that some of the symptoms reported as following thyroid-feeding may be looked on as meat-poisoning. Nevertheless there are symptoms which may follow large doses of fresh thyroid, and so deserve the name mentioned above. These are: rapid increase of the pulse-rate with a rise, followed by a fall of the blood-pressure, emaciation, paresis of the lower extremities, and alteration of the mental condition. By overfeeding of pregnant animals with thyroid-preparations symptoms of thyroidism have appeared in the young—a fact of importance in human pathology and therapeutics.

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#### TRANSFUSION OF BLOOD IN SEVERE CHRONIC ANÆMIA.

EWALD (*Berliner klin. Wochenschrift*, 1895, No. 45) was called to see a man, aged thirty-two years, apparently in collapse. The history obtained then, and examinations made afterward, showed the case to be one of idiopathic anæmia, having many of the characteristics of the so-called pernicious form. The patient could not swallow, injections of camphor had no effect on him, and as a last resort, apparently a hopeless one, transfusion was practised. The blood was taken from the patient's wife, defibrinated, and injected into the median vein to the amount of about 85 c.cm. Anæsthesia was not necessary. The patient's pulse and breathing improved slightly after the transfusion, but injections of ether and camphor were necessary throughout the following night. On the second day after that strength gradually returned and the patient became convalescent. On the third day the blood showed 1,250,000 red corpuscles and 29 per cent. of hæmoglobin. There were few polynuclear leucocytes, no nucleated red corpuscles, very few eosinophile-cells. There were hemorrhages in the retina. The blood after two weeks showed 2,300,000 red corpuscles and 33 per cent. of hæmoglobin. Five months later the hæmoglobin was the same, the red blood-corpuscles 3,500,000 to the c.cm.

After discussing the clinical and pathological features of the case—which he does at some length—Ewald inclines to the opinion of Hunter, that pernicious anæmias are due to autointoxication caused by changes in the gastro-intestinal tract. In view of our present knowledge of autointoxication and antitoxins Ewald raises the question whether, in such cases as the one just cited, the injected blood has not some antitoxic action, so that a poison circulating in the body becomes neutralized or destroyed by it, and so gives the body time to gain new strength.

In addition to the transfusion and after it, the patient was treated by arsenic in various forms, quinine, iron, hydrochloric acid, and a combination of resorcin, bismuth-salicylate, and benzo-naphthol. Meat was but sparingly used in the diet.

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THE ACTION OF THE LEUCOCYTES UNDER CERTAIN POISONS.

CHATENOY has recently made a series of experiments to determine the effect of certain poisons on the leucocytes in vaccinated and non-vaccinated animals.

The poisons chosen were vegetable (ricine and abrine), bacterial (diphtheria and tetanus), and animal (snake-poison). The results from all varieties were the same.

In all cases there was a distinct leucocytic reaction, varying according as the animal was in the process of immunization, was already vaccinated, or had undergone no immunizing process. The animals undergoing vaccination showed all through the course of the process a distinct leucocytosis, which diminished progressively as the process of immunization proceeded.

Vaccinated animals submitted to fatal doses showed more or less reaction according to the degree of immunity conferred on them. In most cases there was a slight leucocytosis, though some showed practically no increase in leucocytes. In none of the cases was there any appreciable decrease in the number of leucocytes. Non-vaccinated animals, when submitted to a rapidly fatal dose, constantly showed a decrease in leucocytes. When submitted to a dose more slowly fatal, the number of leucocytes oscillated a good deal, but there was always a leucocytosis at the time of death. The author regards a progressive and regular leucocytosis as a favorable prognostic sign, a progressive decrease in the number of leucocytes as an unfavorable sign, whilst oscillations including both increase and decrease are to be regarded as signs of slow, but certain death.—*Le Progrès Médical*, October 12, 1895.

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TWO UNUSUAL CASES OF HYSTERIA.

HECTOR W. G. MACKENZIE reports (*Clinical Society's Transactions*, vol. xxviii.) the case of a woman, aged twenty-three years, who had contracture of the legs for two years. Before this she had a long history of gastric and intestinal disorder, supposed at one time to include gastric ulcer, but in view of the later history evidently neurotic. Later, after some disappointment, the patient became paraplegic, with contracture of the legs. There was extreme emaciation; the legs could be perfectly flexed, but could not be extended beyond a right-angle at the knees. The deepest anæsthesia did not relax the contraction. The knee-jerks were absent, the muscles of the thighs and legs much atrophied, their electrical reactions normal. There was great mental depression, no anæsthesia or analgesia, but painful spots were usually present. Convulsions, bloodspitting, and other hysterical manifestations confirmed the diagnosis.

Under treatment by massage, liberal diet, and later, active motion, the contractures disappeared and the patient became completely restored to health, though with occasional attacks of nervous vomiting.



Besides the unusual character of the contractures in this case and its recovery, the report is of great value because the successful treatment was carried out in the general ward of a hospital.

The second case was one of hysterical deafness. (*Transactions of the Medical Society of London*, vol. xviii.). A girl, aged sixteen years, had an attack of sore throat, without any of the usual sequels of diphtheria. Two months later she had a mild attack of influenza. Shortly after that earache, to which the patient was subject, came on. "The Doctor blew up the left nostril with a Politzer. The girl screamed, and from that moment was extremely deaf. The Doctor said he had perforated the ear and the result was not what he anticipated. For some days the ear discharged copiously a green fluid." Three weeks later paralysis and anæsthesia appeared and became almost general, with deafness and aphonia. The general condition was extremely low. After eighteen months, by means of re-education of the muscles, the paralysis was cured. The deafness was complete in the right ear. A watch could be heard when held close to the meatus of the left ear, and words slowly spoken through an ear-trumpet could be understood. Bone-conduction was impaired to the same extent; examination by the speculum was negative. Education of the hearing was then tried, as suggested by Dr. Maximin Gilles, of Marseilles, everything else having failed. "The patient was made to listen to and to count the ticking of a clock at increasing distances, to listen to and to attempt to repeat words and sentences spoken first close to the ear and then at greater distances." Under this treatment the patient rapidly regained the sense of hearing and improved more rapidly than before in every respect. A *résumé* of the literature of hysterical deafness prefaces this interesting account.

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#### EXCESSIVE INTESTINAL PUTREFACTION.

A very important paper has recently been published by HERTER and SMITH on the subject of excessive intestinal putrefaction and its relation to various diseases. The fact that in certain cases of epilepsy the seizure seemed to depend on excessive intestinal putrefaction led the authors to investigate the relation of this process to various other diseases.

The authors base their evidence of excessive intestinal putrefaction on the presence of certain substances in the urine in excess, namely, the ethereal sulphates, and adduce abundant proof to show that the excess of ethereal sulphates is indicative of excessive intestinal putrefaction. The index of the excess of ethereal sulphates is the ratio between these substances and the preformed sulphates. The presence of indican, as indicated by the indigo-blue test, is also used as a test of excessive intestinal putrefaction.

The relation of the intestinal process to several morbid states has been studied, but more especially its relation to the so-called intestinal indigestion.

The authors comment upon the vague and unsatisfactory descriptions of this disease in the text-books and other sources of information, and state that they have observed two varieties of the disease.

The distinction between the two classes of cases is based upon the relation of intestinal flatulence, which they consider the most characteristic symptom of intestinal indigestion, to the amount of indigo-blue determinable in the urine. The two varieties are:

1. Cases in which there is flatulence, and usually only a moderate amount of indigo-blue, and in which the indigo-blue disappears from the urine when the flatulence is removed by appropriate dieting.

2. Cases with or without continuous flatulence in which there is a large amount of indigo-blue in the urine, and this amount is not appreciably changed by the relief of the flatulence.

The difference between the two varieties of cases is explained on the ground that in the first variety the food alone is at fault, and that when food not subject to putrefactive changes is taken the symptoms cease. In the second variety of cases it is assumed that there is present a permanent pathological condition of the intestine concerned in the production of indol, perhaps a catarrhal condition with mucus-formation, for, as has been shown, mucus is particularly liable to decomposition into indol.

Abnormalities in the feces was another symptom observed as indicative of intestinal indigestion, as the authors state no fixed relation has been proved between these abnormalities and excessive intestinal putrefaction; but further study is necessary. Clay-colored stools and the presence of large quantities of fat in the stools were frequently met with where indican was present in the urine.

In a majority of the cases abdominal pain was present, generally associated with flatulence, and at times with distention; sometimes it was spasmodic and migratory, then usually occurring in the lower zones of the abdomen, and again it was fixed and epigastric. In the latter case the authors come to the conclusion that it was not actually dependent on excessive intestinal putrefaction. A feeling of emptiness was another common symptom, at times possibly due to an empty stomach, but in other cases certainly not dependent on this, as it was not relieved by food. The feeding did not bear any direct relation to excessive intestinal putrefaction.

The only remaining local symptom of intestinal indigestion was nausea. This was at times relieved by a diet such as would check excessive intestinal putrefaction, but at times seemed to bear no relation to this process.

Of the general symptoms malaise, lassitude, involuntary muscular twitchings, flushing of the face, cold extremities, etc., were the most important. As the authors point out, these are the first symptoms of neurasthenia, and they do not doubt that many cases of neurasthenia are originated from or complicated by intestinal indigestion.—*New York Medical Journal*, June-July, 1895.

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#### INTERMITTENT PEDICULOSIS.

DE VEVEY cites two interesting cases of intermittent pediculosis in human beings. The subjects were both individuals who had as pets members of a certain monkey-tribe (*macacus cyoamalgus*). In both patients some disease was present which produced a daily exacerbation of temperature. Both patients observed that at the time of the febrile attack they were seized with intolerable itching, which promptly disappeared with the disappearance of the fever.

The examination of the patients at the time of the itching-attacks revealed the fact that they were covered with lice of the variety commonly found on the species of monkey above mentioned; during the period of apyrexia abso-

lutely no lice were to be found. The itching never appeared until the temperature had reached 38.5° C.

This invasion of the human body by monkey-lice during febrile attacks indicates that the conditions regulating this form of parasitism have perhaps more to do with the temperature of the affected species than with special peculiarities. The author holds that the parasites must certainly have found favorable conditions for life in these cases, as the nits of the lice were found attached to the pubic and axillary hairs.

The author thinks that these cases may help to explain certain historical ones, where dead individuals were so suddenly invaded by lice that they were supposed to have generated from the corpse. As the author remarks, the hygienic conditions in those days left much to be desired, and no doubt, in many instances, the individuals died with elevated temperatures.—*Comptes Rendus de la Société de Biologie*, November 1, 1895.

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## SURGERY.

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UNDER THE CHARGE OF

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|                                                                                                                                    |                                                                                                                    |
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### A CONTRIBUTION TO THE SURGERY OF THE HYPERTROPHIED PROSTATE.

RAND (*Annals of Surgery*, August, 1895) says that the operation of castration for the relief of hypertrophy of the prostate has been followed by a sufficient number of successful results to warrant even the most conservative surgeons in advising it in selected cases.

After a discussion of his results in operations by other methods, the author reports the two following cases in which he has performed castration:

CASE I.—The patient was fifty-eight years of age, and gave a history of having had more or less difficulty in urinating for ten or twelve years. Thirty-five years ago he had a single attack of gonorrhœa of moderate severity and short duration. For several years he had been told that he had hypertrophy of the prostate, and has had more or less incontinence, which has grown rapidly worse of late, so that for the past two years the dribbling of urine has been so nearly constant that he has been prevented from doing any active work. Five and a half ounces of urine were present at the first catheterization. His general condition was bad, and there were evidences of degenerative changes in his vascular system. He had not received even temporary relief from previous treatment.



Great difficulty was experienced in catheterization, owing to obstruction in the prostatic urethra; nothing, as a rule, but a long, curved, silver catheter could be passed. Length of the urethra about eight and a half inches. There was a stricture of large calibre in the penile urethra, and one at the bulbo-membranous junction, but it did not seem that they were responsible for any of his symptoms. An examination showed the lateral lobes moderately enlarged, the right a little more than the left. Small Van Buren's sounds were passed with difficulty.

Castration was accepted by the patient, and both testicles were removed February 24, 1895. He had been suffering from catheter-fever prior to operation. Highest temperature after operation, 101.4° F.; normal after third day. The catheter was passed every four or five hours to prevent soiling of the dressings. The house-surgeon found catheterization more easy each day, and soon was able to use a soft-rubber instrument. There was no pain whatever as a result of operation. The second day after operation he voided twelve ounces of urine voluntarily at different times during the day, and, while there was no noticeable increase in the volume of the stream, there was a marked diminution in the straining to which he had been so long subject.

The third night after operation catheterization was neglected, and he had some overflow. The following morning eight ounces were withdrawn, and during that day he passed it without assistance. Six days after operation the amount of residual urine had fallen to a half ounce. The day following there was none. At times, however, during the following week there would be more or less residual urine present.

On March 17th, eighteen days after operation, the first appreciable diminution in the lateral lobes was noticed, but that of the median portion was most marked, a sound passing into the bladder as though the former obstruction had been largely removed.

After going several days without catheterization, five ounces of residual urine were found, showing an atonic bladder.

On April 5th continuous improvement in his local symptoms could be noted. He felt as if his urine passed naturally, and had no straining whatever. Residual urine was generally absent or present only in small amount—an ounce or less. He had, however, considerable of his former inability to retain urine when once the desire came to void it. The interval between the acts of urination was growing longer—two hours, and at times three. Length of urethra seven and a half inches. Prostate as felt by the rectum much smaller, and a small-sized sound dropped into the bladder by its own weight.

CASE II.—Patient sixty-nine years of age; had had for the past nine years frequent urination associated with straining and pain during the act; has urinated every two hours during the night and every hour during the day for the most of the past two years; exceptionally only every three hours. Straining has been constant, and has become progressively worse. He had never had retention of urine, and gave no venereal history. Has during the past year been losing weight, and has suffered much from loss of sleep. Sexual desire has been practically absent for some time. The length of the urethra was nine inches, and the bladder contained four ounces of residual urine. There was moderate enlargement of the median portion of the pros-

tate; the lateral lobes were at least double their normal size, and symmetrical in outline.

During the four months before operation there was at times some improvement, but it would be only temporary. The quantity of residual urine was at times six or seven ounces, and on the whole he had become so much worse that he asked for relief by surgical means. During the week immediately preceding operation he suffered greatly from frequent and painful urination, some nights every fifteen to twenty minutes. This, with the consequent loss of rest, was the only apparent causes for his elevation of temperature, which ranged from 100° to 101° F. for three days prior to operation.

The urine in this case was always acid in reaction, and contained only a small amount of pus.

Operation, May 18, 1895; both testicles were removed, and were found to be far advanced in cystic degeneration. Neither shock nor pain followed. The patient's temperature fell next day to 99.4° F., and was normal after the third day. The day after operation he passed at 8.30 A.M. four and one-half ounces of urine, and the same amount at 10 and 11 o'clock. After this last micturition there were found to be three ounces of residual urine. During the four following days he continued to urinate with less pain, and at from one to three hour intervals.

On the fifth day he passed voluntarily at 7 A.M. five ounces of urine; at 10.30 A.M., seven ounces; at 1 P.M., five ounces; at 3 P.M., seven ounces. At this hour three ounces of residual urine were drawn. His bladder was emptied by catheter at 10 P.M., and he urinated only once between this time and 5 A.M. the following day.

The eighth day after operation the patient had improved greatly in appearance, and looked less careworn. He can see no change in the volume or force of the stream, but straining in voiding urine has diminished more than one-half. Three ounces of residual urine were withdrawn at 10 o'clock the previous night, and he slept till 3 A.M., five hours, and then again two hours. There is no change in the length of the urethra, but examination by the rectum shows marked diminution in the size of the right lobe and appreciable decrease in the left.

Eleven days after operation catheter passed at 11 P.M., and two and one-half ounces of residual urine were withdrawn. The patient did not pass water until 5 in the morning—a period of six hours—and not again until 9.30. During the day, when drinking freely, he urinates every two or three hours. The decreased size of the prostate at so early a date was a surprise, and the inequality of the two lateral lobes still more so. The author is quite sure such an inequality did not exist prior to operation, for he made several rectal examinations. He believes no further comment is required. The facts as stated speak for themselves.

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#### A CONTRIBUTION TO THE STUDIES OF VESICAL MYOMA.

In a comprehensive and interesting article on this subject, TERRIER and HARTMAN (*Rev. de Chir.*, March 10, 1895) say of intravesical myomas that their diagnosis is easy. They betray their presence by a combination of the ordinary symptoms of vesical neoplasms and the physical signs of a tumor

which recalls a uterine fibroma in all its characters of form and consistency. Hæmaturia is one of the most frequently observed symptoms; it was found wanting in but three cases out of eleven; its amount is variable. In general the hæmaturia is intermittent, often accompanied by clots which are sometimes the cause of retention; in many cases it has been noted that it follows intravesical examinations.

More often this hæmaturia is accompanied or followed by other complications—frequent urination, pressing and painful and sometimes difficult; some patients complain of perineal and hypogastric pressure.

Intravesical exploration, although in some cases giving no result except a return and increase in the amount of hæmaturia, permits usually the recognition of a tumor; in the other cases it is probably the volume and hardness of the tumor which make its recognition impossible.

Hypogastric palpation, the vaginal or rectal touch, and especially bimanual palpation, make possible a recognition of the form, volume, consistency, and mobility of the tumor. The tumors are round or lobulated, hard or soft. In combining bimanual palpation with the introduction of a vesical sound, it is very often possible to determine whether the vesical trigone is intact, the sound passing between the fingers and the tumor.

*Treatment.* Eccentric myomas follow the general rules of abdominal surgery. In the intravesical tumor the surgeon is guided by the practice habitual to the ablation of intravesical tumors.

The advantages of suprapubic cystotomy for vesical tumors, established by Professor Guyon for the removal of tumors of large volume from the bladder, are applicable to these tumors.

In voluminous tumors it is better, rather than to enlarge the abdominal wound, to remove the tumor piecemeal, beginning at its centre and progressing toward the periphery.

This is the practice of Neumann, and one which the authors employed at the time of the removal of a recurrent tumor.

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#### THE TREATMENT OF INFECTED WOUNDS BY WET DRESSING.

As far as we know at present, from experimentation and clinical observation, according to STEINMETZ (*Deutsche Zeit. für Chir.*, 1895, Band xli. Heft 1-3), the disinfection of wounds by antiseptics will not always protect the tissues from the spread of the infection. There is no doubt that antiseptic solutions employed in sufficient strength to destroy totally bacteria harm the tissue-cells, and thus hinder the healing process in the wound. The antiseptic dressings must be changed daily to prevent collections of purulent matter beneath them. The usefulness of these dressings is, therefore, at least doubtful and uncertain.

The author having observed an equally beneficial action from weak boric-acid moist dressings and those of 1:1000 bichloride solution, inferred that the action was due to the moist heat, and not to the antiseptic. His experimental studies bring him to the following conclusions: In wounds infected with staphylococci in dogs no beneficial effect is observable from the action of moist warmth; its action is rather harmful, since infection, if protected from further addition from without, has a tendency to become localized, to



become smaller, and to heal, while under the influence of moist warmth it spreads out and takes on a more harmful character (necrosis). Moist warmth has no injurious action on sound tissues and produces no tendency to suppuration, for instance, in fractures where staphylococci are present in the circulating blood; upon infected tissue, however, it acts injuriously, tending to aid the spread of inflammatory and suppurative processes.

The harmful influence cannot be readily observed in transient suppurations where there is a daily changing of dressings, and the pus is not allowed to remain in the wound as it collects.

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#### ALVEOLAR SARCOMA OF THE RIGHT KIDNEY IN A CHILD SIX YEARS OLD.

KOPAL (*Prager med. Wochenschrift*, 1895, No. 19) reports a very interesting case of an enormous alveolar sarcoma of the right kidney, which extended from the right hypochondrium upward to the liver, downward to within three finger's breadth of the symphysis pubis, to the left to within an inch and a quarter of the median line, and on the right continuous with the lumbar muscles. The patient was thin, anæmic, with normal heart and lungs, had slight fever, and complained of marked pain in the abdomen. There was no œdema of the lower extremities. The stools were retarded, and the amount of urine markedly decreased.

The tumor was removed by a laparotomy, the incision through the posterior layer of peritoneum passing externally to the mesocolon. Drainage was established by iodoform-gauze drainage anteriorly in the upper angle of the peritoneal wound and by a drainage-tube passed posteriorly. The recovery was feverless except for the first two days, when there was slight fever.

The amount of urine increased after the operation from 500 cubic centimetres per day to 1600, falling off again to 1200 to 1500. The specific gravity was normal, there was no albumin or crystalline constituents. There was marked arrhythmia of the heart after the operation, which, however, produced no great inconvenience to the patient. The patient gained strength rapidly after the operation and increased in weight. The tumor probably arose from the central part of the kidney, and was an alveolar sarcoma larger than a child's head.

The author believes that such cases should be subjected to operation so long as they have formed no metastases in other organs, and so long as the strength is one-half normal and a careful examination of the urine shows no pathological nephritic changes. The size of the tumor and the age of the child are not direct contraindications to operation.

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#### GASTROSTOMY BY FRANK'S METHOD.

After an extensive experience with other methods, LINDNER (*Berliner klin. Woch.*, 1895, No. 8) believes that Frank's method is capable of producing the best results. In the nine cases which he has operated upon all the patients lived over the first week, although the operation was performed for malignant disease, showing that the operation itself is not more harmful than that by older methods. Its other advantages are the greater retentive

power of the stomach and the absence of excoriation from overflow, and consequent necrosis of the edges of the wound and sloughing out of sutures. There is also no tendency to gradual dilatation of the fistula as in other methods. Of the nine cases, one operated upon *in extremis* died from peritonitis following necrosis of the mesentery, which had been included in the suture by oversight, eight days after operation. Two others died of pneumonia and bronchiectatic processes with putrefaction ten and twelve days respectively after operation. Of the six patients who lived over the first week, four left the hospital 142, 20, 37, and 39 days after operation; one of these died at home shortly after returning there; another has not been heard from and is probably dead; the others are living over a quarter of a year after operation. The author believes that earlier operation in these cases is desirable, and that better results will be obtainable when the patient is not so weak before operation. The author believes that the stomach should be united to the peritoneum before the canal is formed and the fistula completed. In non-malignant stricture this method produces the best of results.

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#### THE RESULTS OBTAINED BY KOCHER'S METHOD FOR THE RADICAL CURE OF INGUINAL HERNIA.

The fact that no death occurred in the 220 cases operated on by this method and reported by Beresowsky leads KOCHER (*Arch. für klin. Chir.*, 1895, Band l. Heft 1) to say that in a patient who has no lesion of a serious nature in any organ the radical operation for hernia does not endanger his life.

The results obtained by the use of deep-buried suturing of the inguinal canal are, in 84 cases, 74 healed by absolutely primary union and could leave the hospital without a truss on an average of ten days after operation. The 10 cases of secondary union required an average stay of thirty-four days in hospital. Sixty-four of the total number of cases were examined at a later period and 6 relapses were found; these cases, with one exception where supuration had taken place along the line of suture, had been operated on by assistants. That is, all of the cases operated upon in a correct manner and healing aseptically were cured.

Forty-eight cases were operated upon by the author's *verlagerung's* method. In 38 primary union occurred, and in 10 there was supuration with discharge of the sutures, and in some cases of the hernial sac.

These were the results of aseptic treatment. The author believes that in large clinics, where varied operations are performed, the proper combination of anti- with asepticism will produce the best results. There were, however, in 31 cases afterward examined only 2 cases of relapse, and these occurred where there had been a large amount of supuration. This method, therefore, gives certain results in cases where aseptic healing is procured. The author believed that a part of the bad results was due to the torsion and bending of the sac in the operation, and has, therefore, modified the method of procedure; the operation is now as follows:

An incision is made extending the entire length of the inguinal canal and somewhat externally; it exposes the fascia of the external oblique muscle and divides the cremaster and infundibuliform fascia; the hernial sac is then carefully dissected and separated from the spermatic cord. An incision is

then made through the external oblique fascia externally to and in a line with the inguinal canal; through this opening a curved hæmostat is passed, guided by the finger in the inguinal canal, through the canal to the external abdominal ring in front of the cord. The end of the freed hernial sac is then grasped and drawn up through the canal out of the opening in the external oblique fascia, where it is rigorously extended.

The hernial sac is then, in contradistinction to the former operation, carried out laterally over the external oblique fascia in a line continuous with that of the inguinal canal above the external portion of Poupart's ligament. It is then fastened by three sutures, one including and closing the incision in the fascia of the external oblique. The remaining portion of the sac beyond the three sutures is excised. The canal is then closed by deep sutures, which, however, lie externally to the cord, which is carefully guarded during the operation.

In 29 cases in which this operation has been performed primary union was obtained twenty-seven times; in 2 cases local suppuration occurred, and the recovery required twenty-seven days, while in the other cases the patients were discharged in nine days. No relapse occurred in any of the 22 of these cases which were seen at a later period.

The author believes that these results make it not only right, but the duty of the doctor to advise radical operation in all cases of inguinal hernia in which there is no complication of excessive size, incarceration, or inflammation, and in which disease of other vital organs, weakness, and advanced age do not contraindicate operation.

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## DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

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UNDER THE CHARGE OF

J. SOLIS-COHEN, M.D.,  
OF PHILADELPHIA.

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### A BRILLIANT METHOD OF DIRECT INSPECTION OF THE LARYNX AND TRACHEA.

Under the name of "Autoscopie" (*Die Autoscopie des Kehlkopfes und der Luftröhre*, Berlin, 1896) DR. ALFRED KIRSTEIN details a new method of examining the larynx and trachea, upon which he has been working for some time and of which some descriptions have been previously given in the journals (*Berlin. klin. Wochenschrift*, 1895, No. 22; *Archiv für Laryngologie und Rhinologie*, Bd. cxi. Heft 1 und 2; *Therap. Monatshefte*, Juli, 1895; *Deut. med. Wochenschrift*, 1895, No. 38). The writer of this notice had the opportunity of seeing this instrument used upon a patient of his friend, Dr. Gleitsmann, in New York, and can therefore give his personal testimony as to the revelations it unfolds.

A long, strong spatula, semi-cylindrical in order to depress the middle



portion of the tongue longitudinally, is the essential requisite of the new apparatus. It reaches to the epiglottis, where its depressed extremity hugs the base of the tongue as it is drawn forward, bringing with it the epiglottis by traction upon the glosso-epiglottic ligament. The thorax and neck of the patient being bent forward, as they would be in leaning over a fence, for example, and the head being extended backward, an almost straight line can be drawn from a point in front of his upper incisor teeth to the anterior wall of the trachea. The space comprised between this plane and that of the posterior wall of the pharynx is utilized. The observer's eye must be considerably higher than the patient's mouth, in order to guide his vision downward along this limited space. A little metallic casing is slipped over the proximal end of the spatula where it joins the handle, converting this portion of the instrument into a tubular passage with a flat top, which prevents the patient's teeth and moustache from getting into the line of vision. The illumination is best secured by means of an electric lamp inserted near the top of the handle, whence its rays are projected through a prism placed above so as to refract the light along the line of the tongue-depressor. It thus brilliantly illuminates the posterior wall of the pharynx, the epiglottis, the posterior wall of the larynx and of the trachea, sometimes even to and including its bifurcation; and it discloses more or less of the anterior portions of larynx and trachea according to the anatomical relations of the parts, and the success of the instrumental interference in pushing the tongue and epiglottis out of the way of the rays of light.

In some cases a spatula is used which reaches over the epiglottis and presses that structure back upon the base of the tongue. This is chiefly for use in certain conditions under local or general anæsthesia. It will be at once understood, as freely expressed by Dr. Kirstein, that this method of illumination is applicable in only a limited number of cases, but that where it is applicable it will extend the usefulness of laryngoscopy beyond the limits of the ordinary mirror. This will be especially the case in lesions in the posterior portion of the larynx and trachea to which direct access can be obtained, and therefore instrumental manipulation be made easier of execution.

For further details we must refer the reader to the original sources mentioned in this summary.

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#### ŒDEMA OF THE LARYNX.

DR. F. E. HOPKINS, of New York, has reported (*Medical Record*, October 19, 1895) a case of acute œdema of the larynx, and gives a summary of the views of various authors upon the subject.

An Irishman, about forty-eight years of age, 235 pounds in weight, an indulger in drinking-spirits and malt liquors, had a mild attack of influenza (la grippe) the latter part of January, 1895. Four days after apparent recovery he was attacked with acute amygdalitis and pharyngitis, which yielded promptly to treatment. Two days later the symptoms of acute œdema became manifest, involving the epiglottis to an intense degree, and most likely the aryteno-epiglottic folds, although they could not be disclosed. It was thought that tracheotomy was urgently necessary. Meanwhile hypodermatic injections of morphine, leeches over the larynx, followed by the application of a cold coil for three days, relieved the symptoms. Convalescence was slow.

The patient did not recover sufficiently to return to his business for two months after the beginning of the original attack.

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#### CYSTS OF THE PHARYNX.

Cysts of the pharynx are rare, or, if not rare, are rarely recognized. A cyst of the rhinopharynx and a cyst of the oropharynx are reported and illustrated by DR. JONATHAN WRIGHT (*New York Medical Journal*, 1895, No. 23), who also presents for comparison an admirable drawing from a microscopic section of the mucous membrane of the rhinopharynx of a newborn infant, showing the muscle-tissue, the lymphoid tissue, and the lymph-spaces.

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#### NECROSIS OF THE MIDDLE TURBINATE.

DR. A. B. THRASHER, of Cincinnati, contributes a paper (*New York Medical Journal*, 1895, No. 23) upon this subject and refers to two of his own cases. One of these, a woman, had been suffering with intense pain in the left side of the nose, radiating over the same side of the face and the head. The projecting mass of an enlarged middle turbinate was severed with a cold snare. A third of the outer portion of the bone was entirely dead. After the adjacent ethmoid cells were thoroughly scraped the patient made a prompt recovery.

The second case was a male, twenty-eight years of age, with obstruction of nasal respiration, and suffering severely from supraorbital and infraorbital neuralgia of some two years' duration. On removal of bony tissue of the right middle turbinated bone a portion of it was found dead.

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### OTOLOGY.

UNDER THE CHARGE OF

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#### HEMORRHAGIC EXUDATION INTO THE DRUM-CAVITY.

HAUG, of Munich, reports the occurrence of hemorrhagic exudation in the drum-cavity in conjunction with hemorrhagic otitis externa, due to the irritation following a pulpitis in a molar tooth. (*Archiv f. Ohrenheilkunde*, Sept. 1895.)

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#### PURULENT LEPTOMENINGITIS AFTER ACUTE OTITIS MEDIA.

JOEL, of Gotha, has observed purulent leptomeningitis following acute otitis media, with mastoiditis, after measles in a boy three years old. The post-mortem examination revealed no caries on the inner surface of the petrous bone, but pus was found filling the porus acusticus internus, and it was suggested that the pus may have found its way from the middle ear by the way of the facial canal. (*Archiv f. Ohrenh.*, Sept. 1895.)

BRIEGER (*loc. cit.*) has suggested puncturing the cerebrospinal cavity in order to decide whether, in addition to a brain-abscess, there is also present a complicating meningitis. The result is sometimes negative, though meningitis be present. However, even in such cases Brieger concludes that the surgeon may earlier decide to operate.

#### TREATMENT OF ACUTE OTITIS MEDIA AND SUPPURATIVE MASTOIDITIS.

HESSLER, of Halle, in a paper on the above-named subject (German Otolological Society: *Archiv f. Ohrenh.*, Sept. 1895), states that in acute otitis media, when the membrane is imperforate, he makes a large curvilinear incision in the membrane extending from its anterior border beneath the malleus to the middle of the posterior periphery. *Syringing is strictly forbidden in all acute cases*, and the patient told to mop the ear gently with cotton as often as necessary to keep it clean. In no instance must the meatus be kept stopped with cotton, as such treatment favors retention of pus. *Inflation of the tympana in the acute stages is strictly forbidden, as this procedure may produce further inflammation by infection from the nasopharynx.* Boric-acid insufflations are also forbidden, as they become unnecessary as a prophylactic against infection from the auditory canal, if *syringing be avoided in acute cases.* If secondary inflammation of the mastoid occur, Hessler advises immediate chiselling, opening of the process by Schwartz's method, suggested for acute cases. By this means all cariously softened bone is entirely removed from the additus and antrum by means of the chisel, great care being exercised not to injure the auditory ossicles. The opening in the bone varies from five to eight centimetres. The wound should not be irrigated, but simply lightly tamponed with iodoform-gauze if there is no parenchymatous hemorrhage; if the latter occur, the wound may be packed more firmly with iodoform-gauze. According to the degree of moisture in the dressings should the latter be changed in one and a half to three days. At such a time any moisture may be mopped from the wound by long strips of sterilized gauze. The auditory canal should be left open. As iodoform-gauze hinders granulation, the later dressings should be simple sterilized gauze.

In the discussion which followed PANSE, of Dresden, agreed in the main with Hessler, but thinks that in no instance should patients be allowed to mop their ears with cotton nor use any form of instrument upon their ears, which they never learn to do aseptically. Panse places strips of iodoform-gauze in the auditory canal in cases of acute discharge, allowing the secretion to run into a bandage, which he changes as often as is necessary, and pursues this plan as long as the strip of gauze is moist as far out as the meatus.

BARTH, of Marburg, asserted that the plan of treatment recommended by Hessler has been employed in acute otitis media, in Lucæ's clinic in Berlin, for twelve years. [It is strange we have heard so little of so good a plan until Gradenigo and Pes and others have demonstrated that there is no other rational method of treatment in the light of our present bacteriological knowledge of the origin and course of infection of the middle ear in acute otitis media.]

STACKE, of Erfurt, states that for five years he has operated under strict asepsis, and avoids in acute otitic suppurations not only syringing, but also



rough mopping on the surgeon's part, and permits absolutely no treatment by the patient. Often one dressing of the ear will be sufficient to absorb all the secretion thrown into the auditory canal. After opening the mastoid cavity he prefers to keep the wound open in its outer portions in order to inspect the deeper parts as long as he may deem necessary.

LEUTERT, of Halle, stated that in Schwartz's clinic syringing is not done in acute otitis media. It is best, however, to keep the auditory meatus closed in order to prevent entrance of air.

BRIEGER, of Breslau, is in favor of dry cleansing with sterilized cotton-mops in acute otitis media. A tampon in the auditory canal cannot in his opinion lead to retention of pus; but retention of pus may easily ensue in the mastoid wound, if closure on the outer side is allowed before healing from the bottom takes place. Hartmann, of Berlin, has long ceased to employ inflation in acute otitis media, and has spoken against irrigation of the wound after mastoid chiselling. A bandage should be retained for a long period only in an aseptic wound, while in septic wounds the dressings should be changed as often as possible. Long-continued tamponing delays healing.

NOLTENIUS, of Bremen, does not think that tamponing the auditory canal with absorbent cotton or gauze after paracentesis will lead to retention of pus; after mastoid operations he considers it important to effect healing from the bottom.

REINHARD, of Duisburg, asserts that in the Schwartz-school irrigation is not practised in acute suppurations.

WALB, of Bonn, considers inflations by either Politzer's method or the catheter or any other method as not only useless but as really dangerous, as by such means pus may be forced into parts of the middle ear previously unaffected, as he pointed out six years ago, in a meeting of aurists in Heidelberg, and was unanimously indorsed by all present.

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#### VARIOUS METHODS OF OPERATING IN OTITIC BRAIN-COMPLICATIONS.

At the fourth meeting of the German Otological Society, May, 1895 (*Archiv f. Ohrenh.*, Sept. 1895), KOERNER, of Rostock, and JANSEN, of Berlin, presented reports on the above-named subject. Koerner first draws attention to the fact that every intracranial suppuration does not always produce symptoms from which safe conclusions can be drawn as to its location. Autopsies, however, have shown that nearly all otitic brain-abscesses are situated near the spot of original suppuration in the ear or in the petrous bone, and often in demonstrable physical communication with it. Since nearly always when the abscess is in the temporal lobe the tegmen tympani et antri is diseased and the abscess lies with its fundus against the dura, it is possible, as Koerner claims he first showed, to unite the emptying of the abscess with the removal of the diseased bone in the subjacent region. In this way, he says, Macewen has since operated. The latter has exposed the base of the temporal lobe by removing the upper wall of the auditory canal and the tegmen tympani, and by that channel has emptied the abscess. In order to be sure of removing all necrotic brain-tissue he makes a counter-opening in the squama close above the posterior wall of the auditory canal. Von Bergmann has recently adopted these procedures, and he also, after partial removal of the auricle and turning

it downward, opens the middle fossa of the skull immediately over the bony auditory canal, pushes the dura upward, and reaches easily in this way the tegmen tympani. He can then empty through the middle fossa of the skull the abscess in the temporal lobe, and through the same space by chiselling outward and downward he can remove the primary centres of disease in the temporal bone.

The new method of exposing intracranial diseases of otitic origin, by following in operating the path by which the infection has passed to the brain, enables the surgeon, when cleaning out the primary focus of disease in the middle ear, to expose the point through which the inflammation in the bone of these parts has invaded the cranial cavity. He can thus demonstrate the presence of intracranial inflammations and render them innocuous before they have induced threatening and unfavorable symptoms.

Universal harmony of opinion reigns regarding the manner and principle of operating in otitic brain-abscesses, but the views respecting after-treatment are very diverse.

Macewen has drained brain-abscesses by means of absorbable drainage-tubes, permitting healing to take place beneath one dressing. Others pack the cavity loosely. Eulenstein has found that tight tamponing may cause fresh brain-symptoms. In sinuous cavities careful irrigation under artificial light is necessary, in order to prevent retention of pus, etc. Retentions often appear to be confounded with "second" abscesses; at least in autopsies on those who have been operated upon a "second" abscess is often found very near the first, while in those who have died without an operation, as a rule, *only one abscess* is discovered. "The search after and evacuation of otitic brain-abscesses by the same route through which pus from the diseased ear or temporal bone forced its way to the brain-substance" are the valuable result of the united efforts of general and aural surgeons.

JANSEN, of Berlin, based his report on the experiences gained in the Berlin ear-clinic. During the last few years, when he excepts cases of meningitis, he has found in 148 intracranial suppurations, 108 extradural abscesses, 35 cases of thrombosis of the lateral sinus, and 5 cases of abscess of the brain. 96 times the suppurations lay in the posterior fossa of the skull, 38 times in the middle fossa, and 14 times both fossæ were invaded. The clinic-books show 58 cases of sinus-thrombosis and 16 cases of otitic brain-abscess: 9 times in the cerebellum and 7 times in the temporal lobe.

Opening the cranial fossa has been performed, always in connection with chiselling open the mastoid cavity for the purpose of exposing perisinuous abscesses. In some instances this end has been obtained by opening the middle cranial fossa according to the suggestion of v. Bergmann described above. In many cases, viz., in those in which the mastoid abscess and the pus-focus in the sinus formed one cavity, this has been opened without further operation. When such has not been the form of the abscess the following method has been adopted: After opening the mastoid and the antrum, the posterior wall of the mastoid cavity has been chiselled away until the anterior lateral wall of the sinus has appeared. Exposure of the sinus must be carried forward until healthy tissue is reached; of course, within limits allowed by the topographical relations. Deep-lying suppurations in the cranial cavity are reached only after removal of the posterior wall of the mastoid portion in its

entirety, best accomplished, in Jansen's opinion, with long-bladed bone-forceps and very narrow chisels. If the abscess extends as far as the jugular foramen, it must be exposed by chiselling away the transverse sinus, and, when necessary, by removal of part of the floor of the posterior cranial fossa. If the part of the sinus-wall first exposed is free from disease, then the posterior cranial fossa must be opened far enough to permit of lifting by means of a raspatorium the sinus and the dura from the posterior wall of the petrous bone. If no pus is found here, and yet symptoms of purulency in the posterior cranial fossa continue, Jansen thinks it imperative to expose the upper knee of the sigmoid sinus and that part of its posterior horizontal limb which joins it. If pus then gushes from the middle fossa, or if, with continuing symptoms of intracranial suppuration, the posterior fossa is found to be free from pus, the middle fossa must be opened, preferably above the linea temporalis. If the opening of the middle cranial fossa is begun by removing the lower part of the squama, inspection of the entire upper surface of the pyramid is made essentially easier. The initial puncture should be made close above the posterior wall of the auditory canal and the opening reach backward from that point several centimetres, and forward as far as necessary. Bone-forceps are best adapted for this operation. Deep-lying extradural abscesses, which originate chiefly from irruption of pus through the semicircular canal—though sometimes from conveyance of pus along the course of the facial and major superficial petrosal nerves—usually have their centre at the point where the posterior limbs of the vertical half-arches unite, and then burrow along the posterior upper edge of the pyramid, sometimes outwardly and sometimes inwardly. Nearly all cases of this kind, as observed by Jansen, originated in acute otitis media. The upper wall of the pyramid, as far as the superior semicircular canal, the posterior upper edge of the same for the same distance, and also the adjoining posterior wall of the pyramid should be removed with bone-forceps, as far as the labyrinth-core. Furthermore, Jansen holds that in order to insure undisturbed healing and to avoid burrowing of pus along the acoustic nerve, it is best to follow the exposure of deep labyrinth-abscesses with opening up the vestibule. This can be done best by removal of the posterior half or two-thirds of the upper semicircular canal, from behind and above downward, by means of narrow, straight chisels. If necessary, also the lower semicircular canal may be partly or entirely removed, and the vestibule laid open from behind forward, by removing the posterior half of the horizontal semicircular canal.

In no instance of all the abscesses in the temporal lobe operated upon by Jansen was it possible to find the point of transition of the pus from the temporal bone to the brain, although the abscess was uniformly directly over and close to the tegmen tympani. In all of such abscesses he removes the posterior upper wall of the mastoid cavity as far as the labyrinth, then, leaving the latter intact, he has removed a part of the squama and the tegmen and penetrated as far inward as the mouth of the Eustachian tube and the outer wall of the cochlea. In this way the field of the operation is freely exposed and made to comprise the deepest parts of infection. Von Bergmann's method of opening the middle fossa of the skull can be used with advantage for exposure of the sinus when symptoms of suppuration in the middle cranial fossa are prominent and when subsequently it becomes plain that suppuration



has spread to the sinus. In general the plan presented already for exposing perisinuous abscesses may be pursued for laying bare the sinus. The thrombosed part of the sinus should be opened forward and downward until undischarged thrombus is reached, even as far as the jugular foramen, if necessary. Backward it is better to proceed a few centimetres further than the thrombus extends. Excision of the outer sinus-wall insures free drainage. When it becomes evident that the septic degeneration in the transverse sinus has not been caused by occlusion with a solid thrombus, Jansen thinks ligation of the jugular is indicated without further investigation of the sinus. This is to be followed by ligation of the facial vein and the jugular cut away as near the base of the skull as possible with a blunt-pointed knife. Of 25 cases of thrombosis of the transverse sinus recently operated upon by Jansen, 11 were cured: 1 after simple emptying of a perisinuous abscess, 8 after opening the thrombosed sinus, and 2 with simultaneous ligation of the jugular. In 5 cases of opening the sinus and in 4 cases of ligation of the jugular death occurred.

In operating upon the so-called labyrinth-abscesses, already referred to, in which the labyrinth is either partly or wholly removed, no disturbances in equilibrium are induced when the labyrinth-contents are already destroyed by suppuration; but if in the operation upon these parts a normal or partly normal labyrinth is invaded, nearly always vertigo, nausea, vomiting, and nystagmus are evoked, as stated by JANSEN in reply to a question from KESSEL, in the discussion which followed the reading of the above report, so that the labyrinth may still be in a measure regarded as the organ of a so-called sixth sense.

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## OBSTETRICS.

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### UNDER THE CHARGE OF

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### COMPLICATIONS OF LABOR OCCASIONED BY OPERATIONS FOR THE FIXATION OF THE UTERUS.

Attention has recently been called to complications of labor in cases in which the uterus had been suspended by adhesions following abdominal section, or after suture of the uterus to the walls of the vagina. Among the most recent and interesting of these communications is that of GRAEFE (*Monatsschrift für Geburtshülfe und Gynäkologie*, 1895, Band ii. Heft 6). The patient was aged thirty-eight years, and a multipara. She was brought into the clinic because of prolapse of the cord and death of the child *in utero*. Upon examination the uterus was found firmly contracted upon the child, and

danger of rupture of the uterus threatening if attempt at version had been made. The patient had been operated upon for suspension of the uterus following the removal, by the vagina, of a subserous myoma. In view of the condition present, the abdomen was opened and the uterus amputated, the stump being left at the lower end of the wound. The patient died an hour and a half after operation. On post-mortem examination the anterior wall of the uterus above the internal os was found adherent to the vagina. The right broad ligament was very greatly stretched, and contained a rupture which opened the pelvic cavity into the vagina. Through this rent fatal hemorrhage had occurred.

Graefe also reports the case of a patient, a multipara, in whom a dislocation of the uterus could not be successfully treated by a pessary. The uterus had been fixed to the vagina in accordance with Mackenrodt's method. The fœtus was in transverse presentation, the wall of the uterus greatly thinned, and the fœtus very plainly to be felt. The condition seemed favorable for a rupture of the uterus; in addition, the patient was seized with eclampsia, and had several convulsions. The abdomen was opened and the child removed; the uterus closed by suture. Both mother and child recovered.

In the *Archives de Tocologie*, 1895, No. 11, GOUBAROFF reports the case of a patient who had been operated upon for retroversion of the uterus by anterior suspension. Her foetus was in transverse presentation, and labor was impossible without assistance. To avoid the danger of rupturing the uterus it was determined to deliver the child by Cæsarean section. On opening the abdomen a band of adhesion was found between the uterus and the inner surface of the anterior abdominal wall. The veins of the broad ligament were very greatly enlarged. The child was readily removed and the uterus closed. Very firm adhesions were found between the uterus and the anterior wall of the abdomen. The operation was successful in saving the lives of mother and child.

In the *Monatsschrift für Geburtshülfe und Gynäkologie*, 1895, Band ii. Heft 5, MACKENRODT discusses the influence which suspension of the uterus has upon labor. He finds that the most firm adhesions develop between the uterus and the wall of the vagina, holding the uterus in a pathological ante-flexion. A normal pregnancy and labor are only possible when the adhesions following the operation gradually loosen spontaneously. If this is not the case, abortion will occur, or a critical condition develop during labor, threatening rupture of the uterus, with loss of mother and child. Should pregnancy and labor be successfully endured, it is very probable that the retroflexion would again develop. In cases where the uterus has been brought by operation into marked ante-flexion, the tubes are usually forced downward and backward, and, becoming pathologically adherent, conception is less likely. It is a better operation to suspend the uterus by ventro-fixation than by vaginal fixation, because it is possible for the adhesions to loosen spontaneously more easily, and danger of hemorrhage and sepsis is less. These remarks apply especially to vaginal fixation of the uterus through the fundus.

When, on the contrary, vaginal fixation is performed through the interior of the uterus, the conditions are more favorable for future conception and normal pregnancy and labor.

#### TOTAL EXTIRPATION OF THE CANCEROUS UTERUS AT SEVEN MONTHS' GESTATION.

FEHLING (*Monatsschrift für Geburtshülfe und Gynäkologie*, 1895, Band ii. Heft 5) describes the case of a patient suffering from cancer of the neck of the uterus seven months advanced in gestation. It was determined to extirpate the uterus, and this was done in the following manner: As it was not deemed safe to delay in the interests of the child, it was not expected that the infant would survive. The abdomen was first opened and the fœtus and placenta extracted. Hemorrhage from the uterus occurred. The broad ligaments were then tied, an elastic ligature placed about the uterus and amputation performed, and the cavity of the cervix seared with a Paquelin cautery. The peritoneal flaps were then closed hastily over the stump. The abdominal incision was then brought together with catgut. The cervix and stump of the uterus were then removed through the vagina. The mother made a good recovery from the operation.

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#### MYOMA OF THE UTERUS, WITH PREGNANCY ADVANCED FIVE MONTHS; SUCCESSFUL REMOVAL OF TUMORS AND UTERUS.

MURDOCH CAMERON, in the *British Medical Journal*, 1895, No. 1823, describes a successful case of total extirpation of the uterus, pregnant five months, for myomatous tumors, which rendered labor impossible. Upon opening the abdomen a large, irregular tumor was seen, consisting of the uterus and a large fibroid of the interstitial variety. An elastic ligature was first applied, and the uterus and tumors amputated. The uterine and ovarian arteries were then tied, the tubes and ovaries removed, and a myomatous tumor blocking the pelvis was loosened from its adhesions and drawn up. The cervix was also separated from its connections, and the peritoneal flaps were stitched to the mucous membrane of the vagina. These ligatures were left long, and were drawn down into the vagina. The parts removed weighed twenty-seven pounds. The patient made a good recovery.

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#### INTRAUTERINE FRACTURE OF THE TIBIA, WITH CONGENITAL ANKLE-DEFORMITY.

FREIBERG reports in the *Annals of Surgery*, 1895, vol. xxii. No. 6, the case of a child who was born with a deformity caused by fracture of the tibia, supposed to have a club-foot from birth. A careful examination, however, showed that an intrauterine fracture of the tibia had occurred. Upon looking into the family history of the child, it was found that abnormalities in the skeleton had been observed in others of the family. Fifty per cent. of reported intrauterine fractures were those of the leg, while but a small number were in the region of the lower epiphysis.

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#### BLEEDING FROM VARICOSE VEINS OF THE VAGINA AND VULVA AS A COMPLICATION OF LABOR.

THIELE (*Deutsche medicinische Wochenschrift*, 1895, No. 50) reports the case of a multigravida who was seized with hemorrhage from the vagina. On



examination the source of bleeding was found to be varicose veins in this region. The hemorrhage became severe, and was checked with the application of ice and iodoform-gauze tampon. Repeated transfusion of saline solution was also practised. The patient came into labor, and was delivered spontaneously of a dead child. Profuse bleeding from the vagina and urethra occurred. The patient made a slow but uninterrupted recovery.

He also reports the case of a multigravida with valvular heart-lesion, who was taken with severe bleeding from the varicose veins of the labia. While the midwife in attendance was cleansing the patient the left labium ruptured, and profuse hemorrhage followed. The child's head was perforated, and at once extracted during very severe hemorrhage. Bleeding continued until the uterus was completely emptied, The ruptured veins were then closed by suture, and the patient made a prolonged recovery.

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## PÆDIATRICS.

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UNDER THE CHARGE OF

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ASSISTED BY

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### TRANSMISSION OF SCARLET FEVER BY MEANS OF LETTERS.

GRASSET (*Annales de Hygiène*, 1895, xxxiv. p. 143) records a case illustrating this method of transmitting the contagion. A child visiting away from home was taken ill with scarlet fever, and the desquamation was so marked that the friends wrote home to the parents describing the condition and enclosing several pieces of the skin. Six and a half days after the letter was received a baby-brother fell ill of the same disease. The only other case of the kind reported, according to the author's knowledge, was recorded by Sanné. Two persons received a letter from a scarlatina-convalescent, who stated that she was desquamating so freely that particles of cuticle fell upon the paper as she wrote. Both her friends fell ill of the disease some days later.

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### INGUINAL HERNIA WITH AN UNUSUAL COMPLICATION.

W. O. ROBERTS, of Louisville (*Archives of Pediatrics*, January, 1896, p. 35), reports a peculiar case occurring in a child one year and three weeks old. from birth there had existed a complete inguinal hernia of the right side, but this had given no annoyance and could always be reduced without difficulty. The day before Dr. Roberts was called in, the child had had what was supposed to be an attack of dysentery, characterized by vomiting, and the

passage of frequent muco-sanguineous discharges from the bowels, with evidence of severe pain. A large tumor occupied the right side of the scrotum, and the mass could not be reduced. Herniotomy was advised as soon as the case was seen by the medical attendant. On cutting down upon the sac the coverings were found to be very thick, and contained little or no fluid. The contents consisted of the appendix vermiformis and a portion of the cæcum. Protruding from the posterior surface of the appendix was an ordinary brass pin, the head being within the viscus and the point sticking out. The appendix was removed, the cæcum returned, and the sac obliterated. The child made an uninterrupted recovery.

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#### "RETURN-CASES" OF SCARLET FEVER.

It occasionally happens after the discharge of a patient who has been treated for scarlatina in an isolation-hospital that the disease reappears in the family shortly after the convalescent's return to his home. Birdwood, for instance, in the annual report of the Metropolitan Asylums Board, reports from the Northeastern Hospital 61 such cases out of a total of 1793 discharges, a percentage of 3.4. It is quite probable that many of these instances are coincidences, arising in fresh sources of infection; but it is also likely in some cases that infected articles, put away on the removal of the patient to the hospital, are brought out again after his return, and furnish the real source of the new infection. In a certain proportion of cases, however, the lately returned patient certainly is the carrier of the disease.

A careful investigation of the conditions under which these "return-cases" may appear has been lately made by CHALMERS (*Lancet*, June 22, 1895) from the statistics of the three fever-hospitals of Glasgow. During 1894, 2593 patients were sent to their homes after an attack of scarlet fever, and in 70 of the houses fresh cases of the disease appeared. In 93 per cent. of these cases the new infection appeared within two weeks after the return. In 19 per cent. the secondary illness seemed to depend upon the recurrence of desquamation or of discharge from the nose or ear in the original patient. In the remaining cases no such cause was found, so that it seems probable that the patient may remain infective, although he is entirely free from desquamation and shows no trace of the disease. There appears to be some evidence of the connection of this latent infectivity with the amount of air-space allotted to each patient in the ward, there being apparently a greater tendency to the communication of secondary infection when the original patient has been treated in an overcrowded ward. Whether this infective power lies in the breath or in the skin, the practical conclusion is adduced that a patient should be isolated from other children for some time after his return from the hospital.

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#### STUDY OF TWELVE EPIDEMICS OF VARICELLA.

SEMTSCHENKO (*Ejenedelnik*, 1895, No. 28, p. 421, abstracted in *Revue Mensuelle des Maladies de l'Enfance*, December, 1895, p. 582) publishes a study of 872 cases of varicella observed in various epidemics during fifteen years at the Hospice des Enfants-Assistés in Kasan.

In all the cases the existence of a period of incubation was observed, which

lasted three days in 5 children, eight days in 7, eleven days in 26, twelve days in 82, thirteen days in 111, fourteen days in 116, fifteen days in 158, sixteen days in 162, seventeen days in 146, eighteen days in 43, nineteen days in 28, twenty-one days in 11, twenty-four days in 6, and twenty-six days in 2.

The period of incubation passed ordinarily without symptoms, though in a certain number of cases failure of appetite, troubled sleep, or bad humor could be noted, with thirst, pulse-frequency, and slight elevation of temperature. All these symptoms increased in intensity about the time of eruption, which appeared usually simultaneously in several regions. Fever varied with the intensity of the eruption and the gravity of the infection, lasting twenty-four hours in 178 cases, two to three days in 481, four days in 109, and five to six days in 15. The highest elevation of temperature was ordinarily on the evening of the second day after eruption. The number of vesicles varied from 20 to 1000; desiccation of the vesicles of each crop required twelve to fifteen hours—sometimes twenty-four to forty-eight hours.

Second attacks were observed very rarely. In 14 cases the interval was eight to eighteen months; in 5 other cases there were two subsequent attacks of the disease. In some cases varicella appeared simultaneously with other infectious diseases, in such combinations as the following: Varicella, measles, and pertussis; varicella and measles (5 cases); varicella and pertussis (3 cases); and varicella and scarlatina.

Among the complications the most frequent was furunculosis; next in order was submaxillary and cervical adenopathy (27 cases); alone or combined with inguinal adenopathy (5 cases), suppuration of glands being noted twice. Other complications were: Erysipelas (15 cases); osteitis (34 cases), sometimes associated with synovitis (4 cases); and otitis media (17 cases). Nephritis was noted in 5 cases, 3 of which terminated in death from uræmia. Albuminuria, sought for in 251 cases, was found in 42.

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#### PSEUDO-MEMBRANOUS RHINITIS AND THE BACILLUS OF LOEFFLER.

GERBER and PODACK (*Deutsches Archiv f. klinische Medicin*, 1895, Bd. liv. p. 262) have collected five cases of fibrinous rhinitis in which the bacteriological examination, completed by inoculations of guinea-pigs, has shown the presence of virulent diphtheria-bacilli. From one case—the only one in which the patient was an adult—diphtheritic angina was contracted by a daughter. At this period the father's throat contained virulent bacilli, but the nose showed only the "pseudo-bacillus." This infection occurred upon the seventy-sixth day after the beginning of his rhinitis. In two other cases the "pseudo-bacillus" replaced the true germ on the forty-fifth and eighty-third day respectively after the beginning of the rhinitis. In a sixth case, one of atrophic rhinitis of twelve years' standing, which the authors think may have begun as a fibrinous rhinitis, the "pseudo-bacillus" alone was found.

The relatively benign evolution of primary pseudo-membranous rhinitis is explained by the anatomical peculiarities of the soil in which the bacilli become implanted, and has an analogue in diphtheritic conjunctivitis, the course of which, as far as constitutional symptoms are concerned, is equally benign. The later appearance of the "pseudo-bacillus" and the disappearance



of the true germ is a fact not infrequently observed in the convalescence from the ordinary faucial diphtheria. In those cases where the "pseudo-bacillus" or streptococci and staphylococci are found the authors believe that we must admit the previous existence of virulent bacilli, which, after a certain time, have been replaced by the micro-organisms found later. While the authors raise the question of the identity of the Klebs-Loeffler bacillus and the so-called "pseudo-bacillus," they hesitate to express an opinion on account of the small number of their observations.

In this connection the view of Abbott (*Medical News*, May 13, 1893) seems most rational. He believes "that the Klebs-Loeffler bacillus is in varying degrees of virulence and even devoid of virulence entirely, and that all bacilli that possess the morphological and cultural peculiarities of the diphtheria-bacillus should be considered as such, irrespective of their pathogenic power. The name pseudo-diphtheritic should be applied only to that organism or group of organisms (for there are probably several) that are enough like the diphtheria-bacillus to attract attention, but are distinguishable from it by certain morphological and cultural peculiarities, aside from the question of virulence."

It certainly seems gratuitous to assume an actual substitution of a distinct and unrelated organism of non-virulent nature in place of the previously existing diphtheria-bacillus. Belfonti (*Riforma Med.*, March 23, 1894, abstracted in *AMERICAN JOURNAL OF THE MEDICAL SCIENCES*, July, 1894, p. 117) has observed a case in which the bacillus was found in extremely virulent activity in the throat of a child seven months after recovery from the disease, and at a time when he had communicated the disease to a sister, with a fatal result. A second examination three months later showed the bacillus still present, but in a state of great attenuation, giving rise to only a slight local inflammation after inoculation. Ravenel (*Medical News*, May 18 and 25, 1895) has recorded twelve cases of pseudo-membranous rhinitis, in every one of which he believes he had to deal with the true Klebs-Loeffler bacillus, which, however, exhibited varying degrees of virulence. His view of the identity of the two forms agrees with that expressed by Abbott.

The subject is one of great interest and of extreme practical importance, and presents a field for further profitable study.

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## PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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### FAILURE OF COMPENSATION IN VALVULAR DISEASE OF THE HEART.

Not a little difficulty has attended the satisfactory explanation of the cardiac dilatation so constantly met with in the later stages of valvular disease of the heart. Why should the initial hypertrophy, so effective in most

cases in compensating the valvular defect, at last give place to dilatation of the heart-cavities?

So far as the aortic valves are concerned, it would appear from the researches of Martin, Huchard, Weigert, Ziegler, and others that the change from a condition of hypertrophy to one of dilatation is coincident with involvement of the coronary arteries in the process of sclerosis and atheroma of the root of the aorta so constantly met with in aortic valvular disease. The blood-carrying power of the coronary arteries being thus impaired, there result changes in the cardiac muscle (increase of interstitial connective tissue and degeneration of the muscle-cells), in consequence of which its contractile power is lowered and dilatation ensues.

In disease of the mitral valve, however, the conditions are different, yet the most pronounced dilatation is often associated with that lesion. In the hope of finding some structural change in the heart-muscle which would suggest an explanation of this dilatation, BANTI (*Centralblatt f. Allgemeine Pathologie u. Pathologische Anatomie*, 1895, vi. Nos. 14, 15) has examined a number of hearts in various conditions of valvular disease, as the result of which he has been led to conclude that the conditions leading to cardiac dilatation in mitral disease are substantially the same as those which induce it in aortic lesions.

Hearts from three sets of cases were examined, representing different stages in the course of the disease. The first of these were patients in whom compensation was good, death having resulted from some intercurrent disease. In these, simple hypertrophy of the heart was found, without discoverable lesion in the muscular tissue.

The second class of cases comprised patients who were beginning to evince signs of failure of compensation in occasional attacks of cardiac failure, which were, however, as a rule, slight, and quickly responded to treatment. In these cases death resulted frequently from embolism or other complications. Here examination of the heart revealed great dilatation of the coronary veins, extending to their remotest ramifications within the heart-muscle. The intermuscular connective tissue appeared swollen, many of its cells being in a condition of parenchymatous degeneration. The muscle-cells were in places undergoing degeneration, as was shown by vacuolation of their protoplasm. In a few of these cases there was distinct increase in the connective tissue immediately surrounding the dilated veins, a kind of phlebosclerosis, which was usually accompanied by slight fatty degeneration of the muscle-cells in the immediate neighborhood.

In cases of more advanced cardiac disease, in which death was directly traceable to the condition of the heart, and in which dilatation was pronounced, the changes just described were found to be much more marked. Dilatation of the venous channels was excessive, their walls were greatly thickened, and there was great increase of the intermuscular connective tissue in their neighborhood, the newly formed connective tissue extending outward from them in all directions into the muscle-tissue. The muscle-cells could be seen in various stages of degeneration—atrophied, vacuolated, and more rarely fatty.

The distribution of these lesions in the heart-wall was not, as a rule, uniform. They were usually much more marked in the ventricular walls than

in the septum or auricles, and were by no means equally extensive in all cases.

The changes in the myocardium underlying dilatation and cardiac failure are, then, substantially alike in both aortic and mitral disease. In both they consist in connective-tissue growth and degeneration of the muscle-tissue consequent on impairment of the circulation in the heart-wall, in the one case resulting from disease of the coronary arteries, in the other from long-continued and excessive congestion of the coronary veins.

As accounting for the relatively early appearance of cardiac dilatation in mitral disease, Banti lays much stress upon the inherent weakness of the right side of the heart, which renders it less able to adjust itself to the increased strain thrown upon it than is the more powerful left ventricle.

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#### THE PRESERVATION OF ORGANIZED URINARY SEDIMENTS.

It is often very desirable for purposes of instruction or demonstration and for comparison at different times in the course of a case of nephritis to be able to preserve any organized sediment which may be present in the urine.

This, according to FISCHEL (*Prager medicinische Wochenschrift*, 1895, No. 12), may be accomplished by washing the sediment two or three times with normal salt-solution, best with the aid of the centrifugal machine, and preserving it in equal parts of glycerin and water to which a little (about 2 per cent.) saturated alcoholic solution of thymol has been added.

Sediments treated in this way preserve their structural characters indefinitely and may at any time be mounted for study with the microscope by simply placing a drop of the mixture on a slide, covering it, and preventing evaporation by a ring of varnish.

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#### THE ELIMINATION OF URIC ACID AND XANTHIN-DERIVATIVES BY THE ALIMENTARY CANAL.

So much stress having lately been laid upon increase of uric acid in the urine as an indication of various disorders of nutrition, it is of interest to know that the occurrence of uric acid and certain xanthin-bases as normal excretions of the alimentary mucous membrane has been shown by WEINTRAUD (*Centralblatt für innere Medizin*, 1895, No. 18).

In a case of leukæmia in which there was a very great increase in the leucocytes, but only slight increase in the uric-acid excretion by the urine, a considerable amount of substance responding to the tests for the xanthin-group of bodies was discovered in the feces, amounting in terms of hypoxanthin to about one gram for the twenty-four hours.

On investigation a variable quantity of these bodies was found to be a constant ingredient of the feces. Their presence was, furthermore, determined to be quite independent of the character of the food. They were still present during a strictly milk-diet, although the decomposition of the nucleo-albumins of milk does not yield any of the-xanthin-group; and also when a non-nitrogenous diet was taken. They were detected in the accumulated meconium in a case of *atresia ani*. Nor was their quantity greatly increased by a diet rich in nucleo-albumins, as was shown by examinations made after the ingestion of considerable quantities of calf's thymus.



The only inference from this would seem to be that xanthin-bodies are normally excreted by the mucous membrane of the intestine, and this fact must hereafter be considered in the study of the excreta in nutritional disorders.

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#### QUANTITATIVE ESTIMATION OF SUGAR IN URINE.

The methods of quantitative sugar-determination in urine which have heretofore been proposed have either been so crude as to lack all diagnostic value or have been too elaborate for ordinary clinical purposes, requiring, as a rule, special laboratory appliances. There has been no test for sugar, which, similar to Esbach's albumin-test, was simple of performance and yet of sufficient accuracy to meet the requirements of the clinician.

Such a test has, however, been recently suggested by PAULUS in the *Korrespondenzblatt für schweizer Aerzte* (1895, No. 16). Its basis is the ordinary Fehling test.

As is well known, the copper of each cubic centimetre of the standard Fehling solution (containing 0.03464 gram of cupric sulphate) is reduced by 5 milligrams of glucose. If, then, all the cupric sulphate of one cubic centimetre of Fehling's solution is reduced by a certain quantity of urine, that urine must have contained an amount of reducing-substance equivalent to 5 milligrams of glucose, and the calculation of the percentage of sugar-content is easy; but as ordinarily employed this test requires the use of a burette, of pipettes, and of beakers, and is in so far inapplicable at the bedside. For Paulus's test only a medicine-dropper is necessary in addition to a test-tube and freshly prepared Fehling solution.

By means of the dropper 2 cubic centimetres (40 drops) of the Fehling solution are measured out into the test-tube, are diluted by the addition of about 20 c.cm. of water, and boiled. This quantity of the copper solution requires one centigram of sugar for its reduction. Urine is then added drop by drop, the heating being continued, until the blue of the Fehling solution has changed to a yellow, when the number of drops of urine added should be noted. Twenty, the number of drops to the cubic centimetre, divided by the number of drops of urine added, gives the approximate percentage of sugar, since that many drops of urine contain one centigram of sugar.

It is maintained by Paulus that this test is sufficiently accurate to fulfil most clinical requirements and so simple as to be readily applicable at the bedside.

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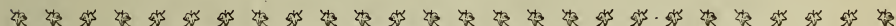
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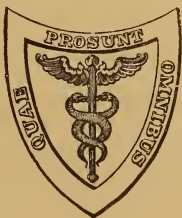
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THE  
AMERICAN JOURNAL  
OF THE MEDICAL SCIENCES.

MARCH, 1896.

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THE CLINICAL APPLICATION OF THE RÖNTGEN RAYS.

So soon as it seemed probable that the Röntgen rays might prove of value to medical science THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, through its Editor, instituted experiments to ascertain methods and results in the clinical application of the discovery. The results of these experiments are given by the gentlemen conducting the various portions of this investigation.

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I.

THE APPARATUS AND ITS USE.

BY WILLIAM FRANCIS MAGIE, PH.D.,  
PROFESSOR OF PHYSICS AT PRINCETON.

THE apparatus with which most of the work was done, which is described in this article, was essentially similar to that used by Röntgen in his original work. The Crookes' or vacuum tube was excited by a large inductorium or Ruhmkorff's coil, made by Apps, of London, and belonging to the Physical Collection of Princeton College. The coil is 14 inches long and 8 inches in diameter. When actuated by 6 or 8 cells, made by the Electric Storage Battery Company of Philadelphia, each having an electro-motive force of about 2 volts and a capacity of about 150 ampere-hours, the instrument ran steadily and gave a spark 6 inches long between points in air at each break of the primary current. A smaller inductorium, with a coil 9½ inches long and 6 inches in diameter, was also used successfully, but the larger coil seemed most

efficient, and was used in most of my work. It is probable that when the vacuum-tubes are improved the Röntgen action may be obtained by the use of much less expensive apparatus than that here employed. It is hardly necessary to state that any voltaic cells or storage-batteries may be used as the source of current, and that care must be taken that no higher electro-motive force is present in the circuit containing the primary coil than that which the coil is designed to bear. This is generally not greater than 12 to 15 volts, and with smaller coils may be less. It is thus manifestly impossible to use the current from a city supply directly with the coil. If it is used at all, a shunt must be introduced. The best form of shunt is the proper number of cells of a storage-battery, which can be receiving their charge at the same time that they are setting the coil in action.

The vacuum-tubes used in my first trials were in the collection at Princeton; after they broke down others obtained from Queen & Co., Philadelphia, were found equally serviceable. My experience agrees with that of others, that the ordinary Crookes' tubes differ very much in their efficiency. Of those in the Princeton cabinet, only three or four, when tested by the *skiascope*, showed that they were furnishing an abundant supply of the Röntgen rays; and most of those on sale in the shops are worthless. The cause for the superior excellence of some tubes over others seems to lie largely in the different thickness of the glass wall. This has been stated by Mr. Edison, and an observation which I made suggested the same explanation to me.

One of the Crookes' tubes with which I worked had the form of a nearly spherical bulb with two conical projections. Four aluminum electrodes were inserted into this bulb, two at the ends of the conical projections, the other two, one a straight wire, the other a flat disk, through the wall of the bulb. Those who are familiar with the ordinary form of the Crookes' tubes will recognize this at once as the one furnished as a companion to another of similar form, but less highly exhausted, to show the difference between the Crookes' cathode-action and the ordinary stratified discharge. If the flat disk-electrode of this tube was made the cathode, a patch of green phosphorescence appeared on the opposite wall of the tube. This spot I made the source of the Röntgen rays in my first attempt to get a photograph; though sufficient was obtained to show the Röntgen effect, yet the action was very feeble; and when the tube in this condition is examined by the *skiascope* it is evident that the tube is not doing efficient work. Other tubes in which the cathode-rays travel long distances from flat electrodes before they fall on the glass show similar feeble action. When any one of the three wire electrodes was made the cathode the characteristic green phosphorescence appeared around it; in the case of the electrodes in the projections the phosphorescence was very brilliant and confined



almost entirely to the walls of the projection. Contrary to my expectation, I found that the tube, when these electrodes were cathodes, gave little or no evidence of the Röntgen rays. The only electrode which made an efficient cathode was the wire projecting into the bulb. When it was made the cathode all parts of the surface of the bulb became phosphorescent, with a yellowish-green light, and the skiascope showed a copious emission of the Röntgen rays. By placing in front of the bulb a plate of lead in which a hole about three centimetres in diameter was cut, the rays from all but a small part of the surface of the bulb could be cut off and the efficiency of different parts of the bulb tested with the skiascope. It became at once evident that the most efficient parts were the thin walls of the bulb, and that the places where the glass was thicker exhibited the action either less well or not at all.

If the Röntgen rays are excited, as Röntgen says, where the cathode-rays fall on the glass, and therefore start at the inner surface of the bulb, the known resistance of glass to the passage of the rays will easily explain this observation.

Another requisite for the production of the Röntgen rays seems to be a high vacuum in the tube. Some observers have made statements which contradict this, but my experience with the tubes in the Princeton cabinet, as well as with others that have been made for me, generally supports it. Some ordinary Geissler tubes, however, showed the Röntgen rays. They were such as had a narrow portion made of uranium glass. This portion seemed to be the source of the rays. I have used one of these tubes with the photographic plate with good results.

The photographic plates used were Hammer's Extra Fast, Carbutt's Eclipse, and plates specially prepared by Carbutt for the Röntgen rays. Most of the pictures of this article were taken on the Carbutt's Eclipse plates. One of them, No. 1, was taken on a freshly prepared Carbutt's special plate, with a material reduction in the time of exposure.

To take a picture or skiagraph by the Röntgen method the photographic plate is placed in an ordinary plate-holder, or shut up carefully in a cardboard box, such as those in which photographic plates are sold, with the sensitized surface turned toward the object to be taken. The plate in its holder is then placed in a convenient position, so that the object may rest upon the cover of the plate-holder, or at least be as near it as possible. The vacuum-tube is set up so that the most efficient part of its surface confronts the plate. I have found that in the case of objects like the bones of the hand or arm, which cannot rest directly on the cover of the plate-holder, increased distinctness of definition is obtained by using as a radiant surface only a small portion of the tube, shutting off the rest by means of the sheet of lead already mentioned. This greater definiteness of outline is gained at the expense of longer time required for the exposure and of less marked contrasts

of light and shade. For much work the whole tube may be used, and a fairly definite outline secured by setting the vacuum-tube at a greater distance from the photographic plate. When the radiant source was that portion of the tube which was exposed by the circular hole in the lead diaphragm, the vacuum-tube could be set about 6 or 8 inches from the plate, and a good picture taken of thin objects, like the hand, by an exposure of one hour. When the whole tube served as a source, an exposure of an hour for the thinner and an hour and a half for the thicker objects was sufficient, the tube standing 12 inches or more from the plate.

It should be noticed that the outline will be better and success more certain if those parts which are specially desired are brought as close to the plate as possible. The proper relative positions of object, plate, and tube may be readily seen by remembering that these pictures are shadow-pictures, and that if for the vacuum-tube we were to substitute an equally large globe of ground glass, illuminated from within, the object would cast a shadow on the plate very like that which it makes in the Röntgen rays. The arrangement which will cast the best defined shadows of the desired object will yield the best results.

The photographic plates are developed in the ordinary way. As the pictures are only shadows, and no artistic effect is required, the development can be pushed further than would be suitable with an ordinary plate, with the result sometimes of bringing out detail that does not appear at first.

The *skiascope*, to which reference has already been made, is an instrument designed to take advantage of the fact that the Röntgen rays cause fluorescence in certain substances, to make direct visual observations of these rays and the shadows cast by them. The fluorescent substance which I have used is the double cyanide of platinum and barium, which is so excellent for the observation of the ultra-violet rays of light, and whose usefulness in connection with the Röntgen rays was announced by their discoverer. Much of the salt which I have obtained from the chemists either exhibits no fluorescence at all with the Röntgen rays, or only a trace of it, and I cannot at present state the conditions of preparation which will insure good fluorescence.<sup>1</sup> The successful results which I obtained were secured with a piece of platino-bari-cyanide paper imported from Germany recently for the Princeton cabinet. A circular disk cut from this paper was fastened, with the fluorescent side inward, by non-actinic black photographer's paper in one end of a brass tube blackened on the inside. By fitting the other end of the tube around the eye, both the eye and the fluorescent sub-

<sup>1</sup> Dr. G. D. Rosengarten has investigated for us the chemical and physical properties of the platino-bari-cyanide.

stance are protected from the light. When this instrument is anywhere near the excited vacuum-tube, provided that the Röntgen rays can fall directly on the fluorescent paper, the fluorescent salt will glow, and the shadows of objects interposed between it and the vacuum-tube appear upon it. It is advantageous to bring the interposed objects as close to the paper as possible. The shadows thus cast have the same distinctions of intensity that they show by their action on the photographic plate. The outlines are generally not so distinct as they are on the plate. With a larger sheet of the fluorescent paper a larger instrument of the same sort can be constructed, which will enable the observer to use both eyes at once and to view a larger field.

This skiascope is very useful as a means of testing the behavior of the vacuum-tube. I have assumed that the vacuum-tube that affects the phosphorescent substance most vigorously will also act most vigorously on the photographic plate; all my experience is in harmony with this assumption, but I have as yet made no experiments to test it. Since slight changes in the performance of the inductorium will make considerable difference in the action of the vacuum-tube, it is convenient to have a test of proper action, such as can easily be made by this instrument.

This skiascope is obviously the instrument which is best adapted to the study of the physical questions connected with the Röntgen rays.

In describing this instrument as my own, I do not wish to be considered as asserting priority over Professor Salvioni, of Perugia, who has described an instrument essentially similar, but only independence in the invention.

In closing this account of the physical matters involved in our joint labors one or two isolated observations may be mentioned. In one case, when the photographic plate, which had been exposed to the Röntgen rays for over an hour, was taken from the plate-holder, the object—an arm and an elbow-joint—was seen by two photographers as a dark band across a light field. This seems to show that the sensitive film is phosphorescent and that the photographic effect is secondary. I have not as yet repeated this observation.

In the opinion of three observers the interposition of a thin plate of aluminum between the vacuum-tube and the fluorescent paper of the skiascope did not merely leave the fluorescence undiminished, but actually intensified it considerably. This effect was observed when the aluminum plate was first used. I tried to verify it later without success. I report it because the result was certain and because it may have some bearing on the success that has been obtained in rapid skiagraphy by those who have used aluminum covers for their plate-holders.



## II.

## IN SURGICAL DIAGNOSIS.

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THE surgical cases that were examined by this method consisted of:

1. A burned hand (Plate I.) with ankylosis of all the fingers at the knuckle-joints and some necrosis of the metacarpal bones, which were in great part soldered together, the little finger being curved under the ring-finger. The skiagraph shows well the bones in the fingers. In the metacarpus, the reason for the fusing of nearly all the picture is that the bones, as a consequence of the very severe burn between the rollers of a heated mangle, were completely soldered together in one mass. It will be noticed that the little finger, even where it passes under the ring-finger, is well seen. Fig. 1 is an ordinary photograph of the same hand.

2. A tubercular elbow-joint (Plate II.) in a child of twelve years, in which it will be observed that not only the humerus shows, but also the radius and ulna. (Compare this with Plate III. of a stouter arm.)

3. The elbow-joint (Plate III.) of a young man of twenty years, who, twelve years ago fell, striking his olecranon violently on a bit of railroad iron, driving the ulna into the groove between the two condyles of the humerus and wedging them apart. The condyles, especially the inner, show well; the radius and ulna were in such contact as to appear only as one. Fig. 2 shows an ordinary photograph of the same elbow, though it by no means presents the extreme deformity as one sees it from various points of view. Strange to say, flexion and extension were excellent.

4. An elbow (Plate IV.) which had been resected for tubercular disease a few days before. This was in plaster-of-Paris splints encasing respectively the arm and the forearm, with a bar of iron extending between the two in order to fix the elbow rigidly. The skiagraph shows the plaster-of-Paris splint and the iron cross-bar. It is to be observed that the plaster is opaque to the rays, while on the contrary the gauze-dressing and the bandages which thickly encased the elbow and the bar were translucent to them. The ends of the resected bones of the forearm show only very faintly, and the end of the humerus also, probably (as the bar shows) from the movements of the child or some modification of the rays by the dressing and bandages.

5. A shoulder-joint with a recent resection of about three inches of the humerus, on account of an old dislocation with fracture of the surgical neck followed by a late osteomyelitis. This picture was also

FIG. 1.



Photograph of burned hand.

FIG. 2.



Photograph of fractured elbow.

taken without removing the bandage and dressing, by fastening the sensitized plate in its holder immediately behind the shoulder, while the Crookes' tube was placed in front of the shoulder, the patient lying sidewise in a bed. The skiagraph shows the outline of the edge of the scapula only; presumably the parts were too thick. Another difficulty was the constant respiratory movement, which has aided in blurring the outlines.

6. I attempted to skiagraph the trephine-opening in a case operated on four years ago, but, though the sensitized plate was left exposed for somewhat over an hour, no picture whatever appeared upon it. Whether this was due to a defect in the plate or in the tubes, or whether, as it seems to me more likely, to the impossibility at present to skiagraph through even one thickness of the skull, I do not know. The patient lay upon a bed with her head resting on a sensitized plate, the trephine-opening being next the plate and the Crookes' tube on the opposite side of the head. The head was not shaven.

7. Plate V. shows a hand of an uninjected cadaver. In it will be observed not only the bones and their cartilaginous extremities, but also in the thumb the sesamoid bones. A needle was thrust into the thumb up to its eye. This foreign and more opaque body comes out much more sharply than do the bones. Under the metacarpal bones of the fore and middle fingers are seen two large buckshot. These were inserted on the palmar surface of the hand, and are, therefore, seen through the bones. The skiagraph shows an enlargement of the head of the metacarpal bone of the thumb, which was found, by subsequent dissection, to be the result of an old injury. Plate VI. shows the wrist of the same hand, the carpal bones and the radius being fairly distinct. The metacarpals and the needle are much less distinct than in Plate V., and the buckshot show blurring at the edges. This is probably due partly to an accidental displacement of the hand, and the indistinctness of the metacarpals to their greater distance from the plate in Plate VI. than in Plate V.

We were anxious, also, at the ingenious suggestion of Mr. Arthur H. Lea, to see whether the hand of a dead person would act differently from the hand of a living person in intercepting the passage of the Röntgen rays, in order that it might be used as a test of death, but, so far as we can judge, no such difference appears.

8. The following specimens of bacteria were exposed to the rays in order to test their effect on the bacteria, namely: pink streptococcus, anthrax, micrococcus prodigiosus, micrococcus cereus flavus, sarcina aurantiaca, yellow sarcine, tubercle-bacillus, for first thirty minutes and then twice for fifteen minutes. In order to prevent the unfavorable effect of the glass tubes, they were so placed that the rays reached the bacteria through the cotton stopper. The tube of tubercle-bacilli was exposed



sidewise through the glass, and not lengthwise through the cotton, for one hour. Dr. Kyle reported that inoculations showed a good, strong growth from all of them. No lethal or even inhibitory effect was therefore seemingly produced upon these bacteria by an hour's exposure to the rays.

**CLINICAL CONCLUSIONS.** The above facts, together with other reports in various medical and lay journals, show clearly that the thinner portions of the body can be skiagraphed with considerable accuracy. This is true of parts of the body as thick as an ordinary elbow. Whether it will be true of the thicker parts of the body, *e. g.*, shoulder and trunk, is doubtful with present methods.

The effect of doubling the thickness through which the rays pass is admirably shown in the skiagraph of a foot in the *British Medical Journal*, February 8, 1896. Where two toes overlapped the skiagraph is twice as dark as where it was taken through a single toe.

One of the difficulties we have had has been the length of time necessary to take the pictures. The shortest exposure in any of these has been twenty minutes with extra quick plates made specially for us by Mr. Carbutt. We observe in the newspapers that it has been stated that instantaneous pictures have been lately taken by Edison and others. If this be so, it will aid materially in getting better-defined pictures both by relieving the patient of the irksomeness and even impossibility of remaining absolutely still for so long a time, as in the old daguerrotype, and by obviating the blurring consequent upon respiratory movements of the chest and the abdomen. The skiagraph of five years hence will be as superior to such as we present herewith as our present photographs are superior to those of forty years ago.

To sum up the clinical results obtained by ourselves and others, it is evident that of the *normal structures of the body* it would seem that all are permeable to the rays except the bones, and, therefore, it is not very probable, at least with our present methods, that we can determine much about them, although in the *British Medical Journal*, February 8, 1896, Mr. Sidney Rowland states that Adolph and Lenz, of Elberfeld, have been able to get pictures of *connective tissue*.

The *bones* are opaque to the rays, hence deformities, injuries, and diseases of bone will be more or less amenable to diagnosis by this method. The best illustration of this that we have seen is the case reported and figured in the *British Medical Journal*, already alluded to. In this case the distal phalanx of the great toe appeared to be double, as though there were two bones in the last joint. There was difficulty in distinguishing which of the two bones was the normal phalanx and which the supernumerary. Prof. Mosetig, therefore, took a skiagraph and was able instantly to determine which was the normal and which the abnormal phalanx.

We shall probably be able to differentiate *fracture* and *dislocation* even possibly in the thicker parts of the body when our methods have become more perfect. As has been pointed out in *The Medical News* of February 22, 1896, this may be of much use in obscure cases with great swelling, for the swelling is not impermeable to the rays. Suspected greenstick fractures can be made evident, and in any case in which possibly a claim for malpractice would be made, if, after the bones are adjusted, they were skiagraphed through the dressings, including even the ordinary board splints (plaster, of course, would not do), such a skiagraph might be of great value in court. Even if not needed for such medico-legal purposes, it would be of value to the surgeon in assuring him that everything is in proper order. *Exostoses* and *bony tumors* of any kind can thus undoubtedly be diagnosticated. *Cartilage* is translucent to the rays.

*Gall-stones* have been skiagraphed outside of the body (but not yet in the living body) by Neusser, Goodspeed, and Cattell (*The Medical News*, February 15, 1896, p. 169), but although only obscured by the thickness of the wall of the bowel into which the gall-stone had been thrust, no diagnosis could have been made from it. If we did not know a gall-stone was there, we could not have guessed it.

*Phosphatic* and probably other *urinary calculi* Neusser has shown to be quite impenetrable to Röntgen rays (as would be suspected by the impermeability of plaster-of-Paris in Plate IV.), but it is very doubtful whether we will be able to utilize them in diagnosis, on account of the bladder lying in the pelvic basin, the bones of which would cut off the rays. The kidneys at present cannot be skiagraphed, as the rays will not pass through so thick a part of the body. *Renal calculi* are as yet beyond our diagnosis by this method.

It is very doubtful also whether our diagnosis of *tumors* will be much aided by this new method, excepting in cases of bony tumors. Other tumors seem to be as translucent to the rays as the soft parts of the body. In tumors of the brain, the bones of the head (especially as the rays would have to penetrate *two* thicknesses of bone) will absolutely preclude any use of this method in diagnosis.

All such statements as the above apply, of course, only to our present knowledge. It is not only possible, but very probable, that we shall be able to accomplish very much more by the improvements which will be introduced into the method within the next few years.

Probably the most important use of the method will be in the location of *foreign bodies*. While some metals are translucent to the rays, others, and fortunately the common foreign bodies, are not translucent: thus in Plate V., of a dead hand, a *needle* thrust into the soft parts of the thumb shows with such striking clearness that we may positively say that, if a needle is suspected to exist in *any* part of the hand (and very

often the history is obscure, so that we are doubtful whether the needle is really in the hand or not), by means of the Röntgen rays we can positively determine its existence and location.

The same skiagraph shows two *bucks*shot which were placed purposely in the palm of the dead hand, and they are clearly seen even through the metacarpal bones. This method has actually been utilized already in several instances, according to the daily papers. Once by von Bergmann, in Berlin, Bury, of Chicago, and several others who have been able to find bullets and shot believed to be imbedded for a long while in the body. It is almost needless to add, as von Bergmann has pointed out, that most of such missiles, if they are quiescent, would be best utilized as phenomena than removed.

Fortunately, also, *glass* is very opaque to the rays, and if the hand is cut by glass, the existence of any pieces which might otherwise be overlooked can be disclosed by the Röntgen rays. One peculiar advantage of the method also is this: A hand supposed still to have a fragment of glass in it can be skiagraphed without removing the dressings even though they be moderately thick, as both gauze and bandages are permeable to the Röntgen rays. Thus Plate IV., of an elbow, was taken while covered with the ordinary voluminous surgical dressings.

The hand from which Plate VII. was taken is that of a patient, a young colored woman, who had suffered amputation of the third finger some months previously. There remains a very sensitive condition of the stump, and at one point a small area exquisitely painful to pressure. The skiagraph was undertaken to determine the condition of the end of the bone, to ascertain whether an enlarged nerve-end would give a shadow to the rays, and to secure any information leading to a choice of operative procedures for relief. The patient was brought for examination by Dr. Stricker Coles, to whom she had come for treatment. An examination of the end of the finger will show upon its ulnar aspect a slight enlargement of the tissues next the bone. No distinct enlargement of the nerve is visible by this method of inspection. This skiagraph was taken with an exposure of one hour without the use of the lead diaphragm and with the Crookes' tube a distance about fifteen inches from the hand. The plate is interesting for its clear delineation of the wrist. In view of the fact that no one point at the end of the stump could be demonstrated to be in a pathological condition capable of cure by operation, the patient was advised to submit to amputation of the metacarpal bone.



FIG. 3.



Pelvis and foetal skull.

## III.

## THE STUDY OF THE INFANT'S BODY AND OF THE PREGNANT WOMB BY THE RÖNTGEN RAYS.

BY EDWARD P. DAVIS, A.M., M.D.,

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THE body of the infant and pregnant womb present conditions alike favorable and unfavorable for investigation by this method. The body of the infant contains a skeleton so much less completely ossified than that of the adult that it is scarcely to be expected that the same clear shadows can be obtained with the apparatus at present at our command. The problem naturally presents itself, Can the skeleton of the fœtus be recognized by this method within the mother's womb? To ascertain the relative density of the pelvis and fetal skull to the rays, the following experiments were undertaken:

The skull of an infant at term was placed in a female bony pelvis upon a sensitized plate completely sealed in a pasteboard box. The pelvis was placed in such a position that it rested upon the plate upon the tuberosities of the ischia and the coccyx. The skull was laid obliquely in the pelvis. To secure as much definition as possible a lead diaphragm was interposed between the tube and the pelvis. An exposure of one and one-half hours was made to test thoroughly the various portions of the skull and pelvis subjected to the rays. The result is appended in Fig. 3. Reference to this illustration shows the fact that the greater portion of the fetal skull gives but a very faint shadow under the action of these rays. The base of the skull is darker, while the temporal region scarcely gives a reaction. In marked contrast to this is seen the black coccyx, which rested upon the plate, and also the rami of the pubes and the spines of the ischia.

A further test was made of the permeability of the fetal skull by placing the skull upon its parietal surface upon a sensitized plate, and by dropping into it two buckshot, which rested upon the lower parietal bone. In order to reproduce these shot the rays traversed both sides of the fetal skull. An exposure of one hour was made, with the use of the lead diaphragm. The accompanying illustration (Fig. 4) shows again the transparency of the temporal portion of the skull, and the fact that the lead bullets are clearly seen through the skull. It was next determined to investigate the action of the rays upon the bones of the fetal skeleton. To ascertain this the skiascope of Magie was employed with direct inspection. In a darkened room, and with the head of the observer covered by a camera-cloth, the foot of an infant three days old, born at term, was held against the skiascope, exposed to the rays of the tube.

FIG. 4.



Fœtal skull containing buckshot.



PLATE I.



Hand with ankylosis of all fingers and deformity of little finger from a burn on the dorsum of the hand. Exposure twenty minutes. Carbutt extra sensitive plate.





Tubercular disease of elbow-joint. Exposure one hour and twenty minutes.





PLATE III.



Intercondyloid fracture of humerus. Exposure one hour and thirteen minutes.





PLATE IV.



Resection of elbow. Plaster-dressing to arm and forearm, with iron cross-bar between. Skiagraphed through the dressing and bandage. Exposure one hour and ten minutes.



PLATE V.



Hand and wrist of an uninjected cadaver, into palmar aspect of which a needle and two buckshot were thrust.







The same hand as Plate V., to show the bones of the wrist and forearm.





PLATE VII.



Hand with painful stump of phalanx.



PLATE VIII.

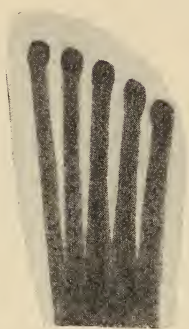


Skiagraph of infant's body.





FIG. 5.



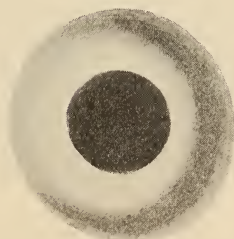
Sketch of living infant's foot, from skiascope.

FIG. 6.



Sketch of living infant's knee, from skiascope

FIG. 7.



Sketch of orbital plate and eye, living infant's head, from skiascope.

The bones of the tarsus and metatarsus and the outline of the foot were readily seen by three observers. One of these, Mr. W. H. Alcott, an artist in attendance, immediately made a sketch of what he saw. The accompanying illustration is a reproduction of his sketch. (Fig. 5.) The knee of the same child was next investigated in the same manner, and a sketch made of what was seen. Here it will be observed that the cartilaginous portions of the joint offer no shadow by the passage of the rays. (Fig. 6.)

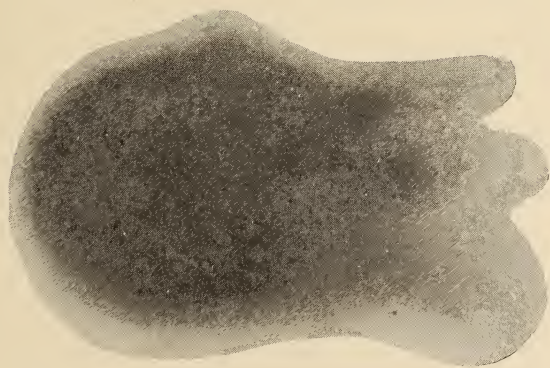
The skull of the infant was next turned, with its temporal region toward the tube, and an effort made to appreciate the passage of the rays through the skull by direct inspection with the skiascope. Here again the temporal region and the brain gave no shadow upon inspection. Upon moving the instrument toward the orbital plate the outline of the border of the orbit and the eyeball appeared, as shown in the accompanying illustration. (Fig. 7.) This led to the question as to the permeability of the eye to these rays. Dr. G. E. de Schweinitz very kindly subjected a pig's eye to direct inspection with the skiascope, and found that the eye does not cast so deep a shadow as do the adult bones, but that the eyeball does not transmit the rays as do the soft portions of the body. The eye was inspected in its longitudinal axis, and also transversely. When the rays pass longitudinally the eye seemed more permeable than when the rays traverse the sclerotic. To test further this question, Dr. de Schweinitz sent me two bullock's eyes, of which a skiagraph was taken by direct exposure to the rays for half an hour. A considerable mass of fat and connective tissue was adherent to the eyes, as they had been removed at the slaughter-house and had not been dissected. It will be observed that this fatty tissue is much more permeable than is the eyeball. In one of these the rays passed through the eye transversely and in the other longitudinally. (Fig. 8.)

The direct inspection of the trunk of the fœtus with the skiascope revealed the fact that the rays permeate the trunk of the newborn child with facility, but that the skeleton casts but a faint shadow. It was possible to appreciate by direct inspection the passage of the rays through the body of a child weighing five and a half pounds, three days old, and born in the ninth month of gestation. The infant was held with its back toward the tube, while the skiascope was applied directly to the chest. The infant's body was not exposed, but remained covered by two thicknesses of light flannel. It was impossible, however, to outline the skeleton clearly or to observe movement in the internal organs.

An investigation of the trunk of the infant by passing the rays directly through the body of the child to a sensitized plate resulted in a very interesting demonstration; the child was clothed in two flannel garments, making four thicknesses which the rays permeated. The umbilical cord



FIG. 8.



Skiagraph of bullock's eyes.

had not separated, and at the umbilicus there was a considerable area of granulating tissue with a slight extravasation of blood, occasioned by pulling upon the cord when the belly-band was taken off for the inspection of the child. The stump of cord remained wrapped in its dressing of aseptic cotton. The child was bandaged upon a sensitized plate, with its back toward the plate, very much as the Indian papoose is fastened to its board. The bandage was the ordinary surgical roller, and entirely covered the trunk of the child's body. It was then exposed to the direct action of the rays, the tube being ten inches from the body, for forty-five minutes. The child remained quiet, did not seem annoyed by the crackling of the tube, and experienced no apparent discomfort. (Plate VIII.) Reference to the accompanying illustration shows the faint outline of the ribs, a dark shadow given by the sternum and underlying spinal column, a trace of the vertebral column, dark shadows cast by the crests of the ilia upon each side, and a shadow given by the stump of umbilical cord, which lay obliquely across the body toward the right, and by the granulating tissue at the umbilicus. The shorter exposure was made in this case from the belief that in very permeable objects too great an exposure may result in losing an outline which could otherwise be obtained.

The attempt to secure a skiagraph of the *fœtus in utero* was naturally attended with great difficulty. The usual timidity of pregnant women, the difficulty which a pregnant patient experiences in sitting or lying in a fixed position, the thickness of the tissue to be permeated, the respiratory movements of the mother, and the *fœtal* movements, necessarily complicated the experiment. A previous attempt had been made to secure an outline of the spinal column in an adult man, with an exposure of two hours. A newly invented sensitized plate was used for this experiment, with a negative result. A similar plate was employed in the case of a girl, aged eighteen years, pregnant eight and a half months, her *fœtus* occupying the usual position in the womb. She was placed in a comfortable position upon a clinical table, the abdomen covered with a sheet, and the patient attended by a nurse. A sensitized plate recently devised by Carbutt was placed against the abdomen upon the patient's left side. The lead diaphragm was interposed between the Crookes' tube and the right side of the patient's body, and any danger of the transmission of shock to the patient was obviated by connecting the diaphragm with a gas-fixtured. The tube was placed vertically, and the patient subjected to the action of the rays for one hour. The plate was uniformly acted upon by the rays, but without definition.

A second attempt was made with the same patient, using the Eclipse plates, which we have found most successful, without the use of the lead diaphragm, and with an exposure of one hour and fifteen minutes. It was interesting to observe on both occasions that the proximity of the

electric apparatus seemed to have no perturbing effect upon the patient. She was informed that an effort would be made to ascertain the position of the child by the use of the electric light; she readily consented to the attempt, and, aside from slight fatigue from remaining quiet in one position, she seemed rather to be soothed by the constant sound of the apparatus, her pulse not varying through the entire time. The result of this second effort to investigate the pregnant uterus shows a difference in the permeability of the fetal body and limbs from that of the uterine wall and amniotic liquid. By reference to the negative it was seen that the faint outline of the trunk of the fetus could be recognized, the darker shadow of its pelvis occupying the upper right-hand portion of the plate, while projecting downward at about the centre were irregular white masses showing the situation of the fetal limbs. The head of the child was so hidden by the mother's pelvis that no definite indication of its presence was obtained. While this experiment failed to outline distinctly the skeleton of the fetus, it offers information which may be of value in further attempts. There has not been the slightest evidence that the passage of the rays through the uterus has affected either mother or child.

From our study of the pelvis and skull, and from our investigation of the living patient, it seems probable that information of practical value regarding the position and attitude of the fetus may be obtained with the future development of this method. It seems probable that the contour of contracted pelvis may also be recognized in future. An abnormal condition of the fetus, such as a tumor, or an accumulation of fluid within a cavity of the fetal body, might be recognized by the abnormal contour of the tissues. The presence of more than one fetus in the uterus could possibly be appreciated. That a distinct outline of the individual parts of the fetal skeleton is to be obtained seems scarcely probable with our present knowledge and the apparatus at present at our disposal. The attempt to obtain information by this method is certainly a justifiable one, as it requires no exposure of the patient, no vaginal manipulation, and puts her to no essential discomfort.

In concluding our account of these studies there are some general observations which may prove of value to clinicians in adopting this method. From Magie's description of the apparatus, it is evident that a well-equipped hospital, lighted by electricity, can readily add to its resources a clinic-room for this investigation. The ten patients whom we examined experienced no discomfort during the application of this process. Where the hand is to be examined, the patient is most readily accommodated in a comfortable chair, with the hand resting upon a table. Where a child's limb is to be investigated, it is best to lay the child upon a comfortable table, and to bandage the sensitized plate upon the limb. We find that surgical dressings, cotton, and the ordinary



bandage interpose no essential obstacle to the passage of the rays. The four children subjected to examination by this method gave us no trouble by restlessness, and, after the first crackling noise of the apparatus became familiar, were not in the least disturbed. This method can be readily applied to bedridden patients. It would be necessary to secure a proper holder for the Crookes' tube, so jointed that the tube can be raised or lowered and extended over the body. The patient could be brought to the examining-room in his bed, the sensitized plate bandaged upon the portion of his body to be examined, and the tube suitably adjusted. The services of a practical electrician and of an expert photographer are necessary for the application of this method.<sup>1</sup> The electric current can be obtained from the Edison Lighting Company, and an additional apparatus could be supplied by the hospital. As dry plates are used, the photographer's apparatus need not be elaborate. A small dark-room adjacent to the clinic-room would be required, with running water.

By the use of the skiascope, at the present stage of our knowledge, the fingers and hands are open to limited investigation. During these studies we had occasion repeatedly to examine the bones in our fingers, and to recognize the metacarpal bones. It was also possible to observe the rays coming between the radius and ulna by looking directly through the arm, and to observe the penetration of the rays behind the trachea by placing the skiascope just behind the larynx. A more extended application of this method depends upon chemical and physical research as outlined by Magie.

It is evident, however, that at present we may obtain by this method valuable information regarding the terminal portions of the skeleton, and regarding the contour of various portions of the body. The presence of metallic substances in the body may be demonstrated. It remains for physical laboratories to furnish the clinician with improved apparatus for the further application of this method of clinical research. It remains for the physiologist to supply us with indices to the permeability of the various normal tissues of the body, and for the pathologist to furnish us similar information regarding the effect of the rays upon diseased tissues. So far as our observation goes, bacteria exposed to the action of the rays are not influenced by them.

<sup>1</sup> We desire to express our obligation to Walker & Kepler, electricians, and especially to Messrs. George Tefteau and Redmond, for their kind and efficient assistance in this investigation. We are also greatly indebted to Mr. F. E. Manning and to Mr. John F. Reese, photographer, for constant and intelligent work with us.

## TUBERCULOSIS OF THE FALLOPIAN TUBES.

(SECOND PAPER.)

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IN a preliminary paper (AMERICAN JOURNAL OF THE MEDICAL SCIENCES, November, 1894) we reported five cases of tuberculosis of the Fallopian tubes which we had found in a series of twenty-five cœliotomies for inflammatory disease of the uterine appendages. Since then we have continued our observations in this direction and have made most careful studies of all cases of pelvic inflammatory disease upon which we have operated. This second series of cases numbers twenty-seven. In this series we have found four cases of tuberculosis of the tubes—14.8 per cent.

CASE VI.—Admitted to Gynceean Hospital. E. K., American, white, aged forty years, widow, housewife, multipara; Para III., miscarriage thirteen years ago (three months). In first confinement it was necessary to perform podalic version; others were normal. In puerperium following birth of last child she had high fever for ten days and was confined to bed for four weeks. Eldest child is nineteen years of age and youngest fifteen years. Menstruation first appeared in her thirteenth year, and was always regular, lasting four to five days, but was very painful until ten years ago. The pain began one or two days preceding the flow, and continued, but much less severe, throughout the period. Ten years ago menstruation became irregular, occurring every two or three weeks and occasionally lasting two weeks, but as a rule three or four days. It continued irregular until menopause, four years later. The patient at time of birth of last child was perfectly healthy, weighing 180 pounds. Since this time she has gradually lost in flesh and strength, particularly during the last year, until she now weighs 110 pounds. She has had leucorrhœa since birth of last child, but it did not become profuse until December, 1894; since then the discharge has slowly increased. Eight years ago she began to have pain, coming on without any apparent cause, in right iliac fossa. This pain has slowly increased until now she complains of sharp and shooting pains in both iliac fossæ, particularly the right, the hypogastric region, and the lumbar region, extending down both thighs to the knee when she makes a misstep and with any degree of exertion; micturition is frequent and painful. The bowels are regular. Appetite good. Has had dyspepsia during last eight months. Headache—frontal and parietal. Urine normal. She had the usual diseases of childhood, but except for present trouble has been perfectly healthy. She has never had any pulmonary or joint disease which might suggest tuberculosis. Father died of cause unknown to patient; mother of apoplexy. An aunt died of phthisis; one sister now has phthisis. Four brothers and one sister are healthy.

Husband died of phthisis pulmonalis eleven years ago. Eldest child is delicate, others are perfectly healthy.

*Vaginal examination.* Uterus normal in size, shape, and position. Tubes somewhat enlarged and indurated.

The strips of endometrium removed by curette were noticed to be very thin, pale, and much harder in consistence than normal. They were hardened in alcohol, mounted in celluloidin, and subjected to microscopical examination, as is our custom with all tissue removed at operation. Microscopically the endometrial tissue is found almost entirely destroyed and replaced by a mass of typical miliary tubercles. No traces of glandular tissue can be found in any part of any section of the corporeal endometrium, and only at long intervals can the normal stroma-cells be seen. The miliary tubercles are pale circular areas composed of epithelioid cells, taking the stain exceptionally poorly, and in the centre are very frequently one or two large giant-cells. These tubercles are separated from each other by a very extensive small round-cell infiltration, a small amount of remaining stroma-tissue. No small round-cells are seen within the miliary tubercle itself. The diagnosis of chronic fibroid tubercular endometritis was made positive from this examination and abdominal hysterectomy determined upon.

*Cæliotomy.* November 27, 1894. The tubes and ovaries and the uterus were removed at the vaginal junction.

*Microscopical examination of specimen.* The specimen consisted of a uterus, complete, and the tubes and ovaries from both sides.

*Right side:* The right tube was 7.5 cm. in length, 0.4 and 0.5 cm. in diameter in its proximal third, 0.6 and 0.7 cm. in its middle third, and 0.8 and 0.1 cm. in its distal third. The proximal third is regular and normal in size, but is very hard in consistency, feeling like a cord. At the junction of the proximal and middle thirds the tube abruptly enlarges, forming a nodule of the same consistency which extends for a distance of 0.1 cm. Beyond this, for 0.2 cm., the tube again becomes of normal size and is much softer. Then, again, there is a nodule 1.5 cm. in length, 0.1 cm. in diameter, having the same characteristics as the other nodule. This last nodule closes the tube-lumen and leaves the fimbriæ, which are few in number, normal. The peritoneal covering is perfectly normal except over the distal nodule, where there are two minute opaque tubercles which resemble miliary tubercles. The mesosalpinx is of normal length; the parovarium can be plainly seen and seems in every respect normal. The ovary was small, measuring 3 x 2 x 1.2 cm. Its surface was very irregular, formed in small convolutions, and contained occasionally a small cyst filled with blood, a senile ovary. A small hydatid of Morgagni was attached to the fimbriated extremity of the tube.

*Left side:* The tube was 0.8 cm. in length, 0.4 and 0.5 cm., 0.6 and 0.7 and 0.9 cm. in diameter. The proximal third was normal in size and of the same consistency as the corresponding portion of the other tube. At the junction of the proximal and middle thirds there was an enlargement or nodule. The remaining portion of the middle third of the tube was much softer and smaller in size. The greater part of the distal third was converted into a nodule which was much softer than the corresponding portion of the other tube. The peritoneum was normal except in the outer third, where it was covered with a few adhesions, and the closed and inverted abdominal ostium was adherent to the ovary. The



mesosalpinx was obliterated toward the fimbriated extremity of the tube, but was otherwise normal. The parovarium was normal. The ovary measured 3 x 3 x 2 cm., and presented, with the exception of an apoplexy the size of a hickory-nut, the same characteristics as that of the opposite side. On section the tube-lumen of each tube was completely obliterated in the proximal and distal thirds, and in the middle third, over the softer areas, it was somewhat dilated and filled with blood (hæmatosalpinx). The tube-walls were throughout exceedingly hard in consistency. The uterus was larger than normal, measuring 10 cm. in length, 6 cm. in width at the fundus, 4.5 cm. at the middle of the lower uterine segment, and 4 cm. throughout the entire length of the cervix. The muscular walls, particularly that of the cervix, was very much harder than normal. The peritoneal surfaces were smooth and normal. The external os was enlarged, allowing the introduction of the tip of the index-finger. There was a small bilateral laceration of the cervix. On section the muscular wall toward the endometrium was very resisting to the knife. The endometrium over the entire surface of the fundus presents small, pin-point and pin-head elevations which frequently showed punctate hemorrhages. The traces of the recent curettage were noticeable. The uterus is typically that of chronic general endometritis. These specimens showed no diagnostic characteristics of tubercular disease, except the hard nodular condition of the tube.

*Microscopical examination of specimen.* Sections were made, including every part of each tube and ovary and all portions of the endometrium and muscular wall, from the external os uteri to the tube at each cornu.

*Left side:* Sections made through the inner half of the proximal third of this tube show the mucous membrane almost completely destroyed, the only vestige left being one or two small spaces surrounded by cylindrical epithelial cells and a small amount of stroma, which is either infiltrated by epithelioid cells (a miliary tubercle) or replaced by fibrous tissue. The lumen is generally not to be seen, but when present is filled with degenerated blood. The inner two-thirds of the tube-wall is converted into dense fibrous tissue, in midst of which a small bundle of muscular tissue is sometimes seen. The presence of muscular tissue becomes much more frequent toward the peritoneal covering of the outer third, where continuous bundles are separated by a small amount of fibrous tissue. The peritoneal covering is much thicker than normal, but no miliary tubercles can be found. The outer half of this third of the tube presents the same appearance, except that the infiltration is not so chronic, small round-cell infiltration is rare, miliary tubercles are more frequent, and may contain a small giant-cell. Here, also, a few cells occupy the tube-lumen instead of blood. Sections through the nodule of the middle third of the tube show the cylindrical epithelial cells surrounding larger spaces separated by stroma composed partially of fibrous tissue, and rarely contain any tubercular tissue, but perhaps one or two minute areas of calcification. The partially destroyed mucous membrane folds of fibrous tissue forming the space described all converge and are attached to a central area of dense fibrous tissue, which contains no small round-cells and has in its centre a single miliary tubercle. The wall of the tube is the same as that described. The softened area, the distal half of the middle third of the tube, is the seat of an old hemorrhage, which either fills up the spaces surrounded by the cylindrical

epithelium, or it dissects the mucous membrane, the submucosa, from the fibrous tube-wall. Sections through the distal third of the tube show the central portion of the tube composed of a circular area of chronic fibrous tubercular tissue containing many small foci of calcification, and the centre is a space bounded by caseation. Many of the tubules here contain small giant-cells. This area of tissue is surrounded by another, which is extensively infiltrated with small round-cells, and surrounding this again are the same destroyed mucous membrane and the tube-wall of other portions of the tube. The mesosalpinx shows nothing of interest. Sections through various portions of the ovary are characteristic of senile change.

*Right side:* The sections made through the various portions of this tube show the mucous membrane more completely destroyed and small round-cell infiltration generally more frequent and extensive. Tubercular tissue is even less frequent and not a single giant-cell can be found. Otherwise, including the area of hemorrhage, it does not differ from that of the opposite side. The ovary shows a large area of hemorrhage surrounded by a capsule. Beside this, there is nothing of interest to be seen. The mesosalpinx is slightly thickened, but in other respects normal. Sections through the uterus show a very thin endometrium, a great part of it having been removed by the curettement, composed of the same characteristic tubercular disease found in the examination of the tissue removed by the curette. True endometrial tissue is, however, seen in an occasional gland, more often as the muscular wall is approached. The disease extends over the entire surface of the corporeal endometrium, into each cornu to the tube and as far as the internal os at the cervical endometrium. In the muscular wall, for a distance of 0.5 cm., an occasional miliary tubercle, with its giant-cell surrounding small round-cell infiltration, is very frequently seen. The cervical endometrium is simply that of a very chronic inflammation. Where the tubercular disease began is difficult to determine. A large number of sections were stained for tubercle-bacilli, but none could be found. It certainly must have been long standing and very slow in development. Both tubes were equally involved and show the chronic form of tuberculosis. Here, also, the disease was undoubtedly disappearing, becoming a conservative process. A few months later these tubes would most probably be found converted into fibrous cords. In the uterus the disease was also very chronic, but considering the fact that the muscular wall was involved to the extent of 0.5 cm. it is possible that it would have extended through the uterine wall, or by metastasis, to the peritoneum or other organs. These specimens, therefore, represent chronic fibroid tuberculosis of the corporeal endometrium, extending into the uterine wall, and bilateral fibroid tubercular salpingitis. The ovaries were not involved by the tubercular process.

CASE VII.—M. H., colored, aged twenty-seven years, single, cook, nullipara. No miscarriages. Admitted to the Gynceean Hospital February 9, 1895. Menstruation first appeared at fifteen years, regular, usually lasting four days, never profuse, but painful during the period. She had the usual diseases of childhood, including scarlet fever, but otherwise has always enjoyed excellent health until three years ago, when she had an attack of pelvic peritonitis which kept her in bed for nine weeks. At this time she complained of pain in both iliac fossæ, particularly the right. Since this trouble she has not been well. Menstruation has

been much more painful, the pain beginning three or four days before the onset of the flow and lasting throughout the period. It was, however, regular and in other respects normal until September 5th. This period was ushered in with excruciating pain, principally confined to the left iliac fossa; the flow was very scanty and lasted two days. The pain persisted, and has continued with but slight interruption ever since. She has steadily lost in flesh and strength, and has had night-sweats and fever since October. Her normal weight was 150 pounds, her present weight is 115 pounds. Except that she has had a slight showing in October she has not seen a menstrual period since the one described. Has slight leucorrhœa; micturition normal. She has had diarrhœa, lasting two weeks, three times during the last two months. She has been unable to leave her bed since the September attack.

*Family history:* Father died at sixty-three years of age of cause unknown to patient. Mother is living and well, fifty-two years of age. Six brothers and sisters living and well. One sister died in confinement. There is no personal history of any condition which might suggest tuberculosis, and no lesion can be found on careful physical examination. There is no history as to cause of primary attack of pelvic peritonitis, but it was very probably gonorrhœal in origin.

*Patient's condition before operation.* She complained of pain over the entire lower abdomen, night-sweats, chills, and fever. Her temperature on admission to the hospital was 101° F., pulse 102, and respirations 28. She is very anæmic and much emaciated. The abdomen was tender to palpation, with flat percussion-note reaching as high as the umbilicus. Nothing could be outlined by vaginal examination but a small virgin cervix protruding from a dense and tender mass which completely filled the pelvis.

*Cœliotomy.* The pelvis was filled with a mass which consisted of the uterus firmly fixed between two large abscesses, over which lay the Fallopian tubes. Everything was matted together by adhesions, and loops of intestine were adherent posteriorly and over the mass and to the anterior parietes. In separating a loop of intestine from the right side the abscess was opened, the intestines having formed part of the wall of the cavity. About five ounces of pus having a fetid and fecal odor escaped. A cover-glass preparation was immediately made from this pus, and it was found to contain streptococci in large numbers and a long and a short bacillus, the short bacillus very probably being the bacillus coli communis. The right tube was removed with a portion of the abscess-wall on this side. The same was accomplished on the left side. A small rent which occurred in the serous coat of the intestine while freeing adhesions was repaired. Both abscess-cavities were thoroughly flushed out and the abdomen closed with glass drainage. It was necessary to cleanse the tube every fifteen minutes. On the third day her condition became alarming, her pulse having risen to 160, temperature 103.6° F. Feces were escaping through the tube, and the patient was in a condition of profound sepsis. At this juncture recourse was had to a measure which undoubtedly saved her life. This consisted in substituting for the original tube a double glass tube for continuous irrigation. At the same time the patient was placed upon treatment of vigorous stimulation. From this time onward, for a period of four weeks, she took sixteen ounces of whiskey, twenty grains of quinine, one-fifth grain of strychnine, one drachm of the tincture of digitalis, in divided doses



daily, and from four to six ounces of milk every hour. All this she retained, and there was seldom any tendency to nausea. Irrigation through the double tube was continued for three days. At this time the tube was accidentally broken, and, the indication for its use having ceased, a rubber tube was substituted. The patient improved, her pulse dropping to about 100 and assuming a better character, and the temperature falling to 100° F. or under. Feces continued to discharge in large quantities through the tube, and have persisted since its removal, a few days later. There has been a persistent discharge of pus at times through the fecal fistula, as well as from a fistulous tract which opened about one inch below it.

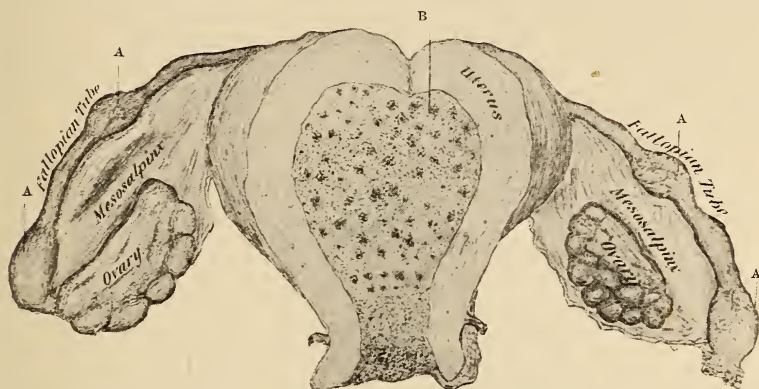
A small quantity of feces passes daily by the rectum. The urine has remained normal. Since April 3d she has been able to sit up in bed for an hour or two daily. Examination by the vagina on April 12th showed the cervix about one inch from vaginal outlet, with a bulging mass on the left side.

*Macroscopic examination of specimens.* The specimen consisted of the tubes from both sides, portion of the left ovary, and a mass of tissue, probably ovarian, which evidently formed the wall of an abscess.

*Left side:* The tube is 10 cm. in length, and 1.2, 1.5, and 2 cm. in diameter. It is much harder than normal in consistency, very tortuous, bowing itself over the ovary to which it is adherent, and progressively enlarged from its proximal to its distal extremity. The abdominal ostium was closed, and there were no signs of fimbriae. The entire peritoneal surface was covered with adhesions, particularly posteriorly, where this portion of the tube was considerably lacerated. On section the tube-lumen is very small, but patent throughout. It contains a small amount of inspissated pus or caseous material. The portion of mucous membrane in relation with the lumen showed a narrow margin of caseating tissue. The mucous membrane was much thickened and destroyed by inflammatory disease. The tube-wall was very resisting to the knife, hypertrophied, measuring 0.3 cm. in diameter, and also showed signs of inflammation. The mesosalpinx was obliterated and a small portion of ovarian tissue, 0.2, 1.5, and 1 cm. in diameter, was in immediate relation with the tube. This portion of ovary was covered with adhesions and very much lacerated upon its posterior surface, where it must have formed part of the wall of an abscess. There were a few follicular cysts to be seen on its anterior surface, otherwise it showed nothing of interest.

*Right side:* The tube from this side presented about the same characteristics as that of the opposite side, except that it was not so large and there was no ovary attached. It measures 8.5 cm. in length and 1, 1.5, and 1.8 cm. in its various diameters. The abdominal ostium was closed and no fimbriae could be seen. The tube was very tortuous, almost stony-hard in consistency, covered with the same sort of adhesions. The mucous membrane was much thickened, diseased, and that tissue which formed the immediate wall surrounding the lumen showed the same degree of fatty degeneration seen in the opposite tube. The lumen was in every part much larger than normal and was filled with inspissated pus. The mass of tissue, which evidently formed part of the wall of an abscess, was of about uniform thickness, generally 2 cm., irregularly shaped, with ragged edges measuring 8.7 cm. in length and from 2 to 3 cm. in width. It was covered on one side by smooth, normal peritoneum, beneath

which, here and there, a small follicular cyst was to be seen, hydrops folliculi. From these cysts it was concluded that the tissue was ovarian. The other surface was uniformly corrugated or convoluted, very much resembling the inner wall of a papillomatous cyst. It, however, seemed probable that it was inflammatory tissue, the wall of an abscess.



A. Tubercular nodule. B. Tubercular endometritis.

From the macroscopical examination of these specimens we believe that there was nothing to suggest tubercular disease, although it was thought of, and the pathological diagnosis would have been chronic bilateral pyosalpinx and tubo-ovarian abscess with extensive adhesions, the abscesses containing specific micro-organisms, the result of infection from the bowel or a renewal of primary gonorrhœal infection. Considering also that the cover-glass preparations, which were carefully stained for tubercle-bacilli, gave a negative result and that a large number of streptococci were found, this non-tubercular diagnosis was even more justifiable.

*Microscopical examination of specimens.* Sections made through the various portions of this tube, including the cornu of the uterus, show the same characteristics already described in Case VI., except that the disease is more acute and extensive—chronic diffuse miliary tuberculosis. The mucous membrane is in every part completely destroyed and replaced by a mass of tubercular tissue. The tube-lumen is filled with caseous material, and the mucous membrane, from the margin of the lumen to the muscular wall of the tube, contains at frequent intervals a small area of caseation-tissue, often forming an abscess. Between these areas of caseation the typical tubercular tissue, epithelioid and small round-cell infiltration, with giant-cells, are seen. The tubercular tissue is not, as a rule, arranged in distinct miliary tubercles with perhaps a giant-cell surrounded by small round-cell infiltration, but is diffuse, the small round-cell infiltration being distributed in indefinite areas, separated either by caseation-tissue or epithelioid infiltration, which sometimes contains a typical giant-cell. Nowhere in any section can cylindrical epithelium or stroma-tissue of the normal mucous membrane be seen. As the muscular wall is approached the small round-cell infiltration is

more extensive, and with progressive frequency small portions of muscle-fibre are seen separated by tubercular tissue. The muscular wall is infiltrated with epithelioid and small round-cells to within 0.1 cm. of the destroyed peritoneal covering. In no part is the tubercular disease seen extending beyond the limits of the tube. Sections through the mesosalpinx show a small amount of small, round-cell infiltration near the tube. The parovarium is normal. Sections made through the portion of ovary show in the proximal half chronic perioöphoritis and diffuse and sclerocystic degenerative oöphoritis, and in its distal half the same chronic diffuse miliary tuberculosis as seen in the tube. This half of the ovary probably formed the wall of an abscess.

*Right side:* Sections made through every portion of this tube show the same characteristic tissue seen in the opposite tube. The muscular wall is, however, more hypertrophied and infiltrated with epithelioid and small round-cells, particularly in relation with the mesosalpinx. The disease here also extends to the uterine cornu. The mesosalpinx is very short and shows a small amount of small round-cell infiltration. The parovarium is not seen. The small amount of ovarian tissue which is found attached to the mesosalpinx is converted into typical tubercular tissue. Sections from the irregular portion of tissue, the abscess-wall, show it to be composed of ovarian tissue almost destroyed by the diffuse form of tuberculosis already described. Five sections from each tube were stained for tubercle-bacilli, and three typical undoubted bacilli were found. These specimens, therefore, present bilateral chronic diffuse miliary tubercular salpingitis or pyosalpinx, localized to the mucous membrane and inner half of the muscular wall, bilateral tubercular abscess and chronic diffuse miliary tuberculosis of both ovaries, sclerocystic degenerative oöphoritis of the left ovary, and chronic bilateral perisalpingitis and perioöphoritis. It is concluded from the history and physical examination of this patient that the disease was primary in the genital tract. The uterus and portion of left ovary which was not removed must have formed part of the disease.

CASE VIII.—B. L., Irish, aged thirty-four years, housewife, married ten years, nullipara, no miscarriages. Admitted to the University Hospital January 28, 1895. The menses first appeared in her fourteenth year. They have always been irregular, sometimes absent for several months, scanty, lasting two days and very painful. Except for an attack of rheumatism and her present trouble she has always been healthy. For the last fourteen years she has complained of backache and pain in both iliac fossæ. She has had a profuse leucorrhœal discharge for a number of years. The bowels are constipated. The patient first appeared for treatment at the University Hospital Dispensary in July, 1894. Local applications were made to the cervix and vaginal vault bi-weekly with marked benefit. The leucorrhœal discharge and menstrual pain almost disappeared and the pain in the iliac fossæ was much relieved. On admission to the hospital she complained of the symptoms described above. The temperature, pulse, and respirations were normal.

*Family history:* Mother, father, two brothers, and four sisters are living and perfectly healthy. A sister died when six months old. Husband is living and healthy. There is no possible history of tuberculosis to be gained. A careful physical examination of the patient reveals nothing suggestive of tuberculosis.



On vaginal examination the cervix was found eroded, the uterus retroverted to the second degree, and both tubes and ovaries prolapsed, tender, and adherent to each uterine cornu.

*Celiotomy.* February 8, 1895. The parietal, visceral, and omental peritoneum was seen to be studded with miliary tubercles. The miliary tubercles were the size of a millet-seed, translucent, and more numerous in the pelvic cavity than elsewhere. They were evidently not of long duration. The omentum was adherent to the anterior pelvic brim. The tubes were enlarged to the size of an index-finger, with the abdominal ostii closed, and with the ovaries were covered with dense old adhesions which bound them to the pelvic floor and each lateral wall of the uterus. Both tubes and ovaries were removed. The abdomen was closed without drainage.

Convalescence was normal, the pulse ranging between 76 and 85, and the temperature never going above 100° F. She left the hospital one month after operation, apparently in good health.

*Macroscopical examination of specimens.* The specimens consisted of the tube and ovary from both sides. On the peritoneal surfaces of both specimens here and there, generally a centimetre apart, a translucent miliary tubercle the size of a millet-seed was to be seen.

*Right side:* The tube was very tortuous, 8.5 cm. in length, and covered with dense old adhesions which destroyed the peritoneum, except in the last centimetre of the distal third. It measured 0.5, 1, and 2 cm. in diameter. The abdominal ostium was closed and no sign of fimbriæ was to be seen. On section the lumen in the distal third, where the tube is dilated, measured 1.5 cm. and contained considerable clear fluid and a mass of caseous material. The lumen was obliterated in the proximal third and admitted a pin-point and head in the middle third. The mucous membrane was macroscopically destroyed in every part of the tube. The muscular wall was very resistant to the knife, slightly hypertrophied in the proximal two-thirds and about normal in thickness in the distal third. The mesosalpinx was obliterated and the tube was in immediate relation with the ovary. The ovary measured 4 x 2 x 2 cm. in diameter. It was covered with adhesions, particularly toward the paroöphoron, and was very frequently infiltrated with small cysts, hydrops folliculi. In the centre of the oöphoron there was a distended corpus luteum or apoplexy, the size of a cherry, containing coagulated blood.

*Left side:* This tube presented the same characteristics as that of the opposite side, except that it was not so large. It measured 7.5 cm. in length and 0.5, 0.8, and 1.5 cm. in diameter. It was covered with adhesions and progressively enlarged in the proximal two-thirds and was dilated into a cyst in the distal third. The abdominal ostium was closed. The tube-lumen was obliterated in the proximal third, the size of a probe-point in the middle third, and 1 cm. in diameter in the distal third, where it contained the same sort of fluid and caseous material as the opposite side. The mucous membrane was destroyed, the muscular wall hard in consistency, but of about normal thickness, except at the site of cyst-formation, where it had almost disappeared. The mesosalpinx was obliterated. The ovary was much smaller than normal, measuring 3 x 1.5 x 1 cm. in diameter. It was also covered with firm, old adhesions, and contained a few follicular cysts. A Kobelts cyst, the size of a pea, with a pedicle 3 cm. in length, was attached to the site of the parovarium.

Macroscopically these specimens were those of chronic salpingitis or hydrosalpinx and chronic oöphoritis, tubercular disease being suspected because of the presence of tubercular peritonitis.

*Microscopical examination of specimens.* *Right side:* Sections made through all portions of this tube show the usual characteristics of chronic fibroid tuberculosis, involving particularly the mucous membrane, but also infiltrating the inner half of the muscular wall. In the mucous membrane of the proximal two-thirds of the tube the disease is almost always confined to and destroys the stroma-tissue. The rugæ are seen to be very much distorted and enlarged and covered by intact columnar epithelial cells, which show marked proliferation. These rugæ of mucous membrane usually coalesce with other rugæ, giving an appearance somewhat like that of malignant adenoma. The stroma-tissue is generally completely replaced by epithelioid and small round-cells, which are often formed into a miliary tubercle. The miliary tubercles are of the fibroid type and sometimes contain from one to even eight or ten giant-cells. The giant-cells are unusually large and mostly composed of definitely outlined central nuclei. The small round-cell infiltration does not, as a rule, surround each miliary tubercle, but is equally distributed in the epithelial infiltration. It becomes more extensive as the lumen and proximal third of the tube are approached. None of the miliary tubercles shows signs of caseation. Toward the muscular wall the disease becomes progressively more extensive and chronic. The rugæ of mucous membrane here coalesce more frequently, the small round-cell infiltration becomes less and less extensive, and the tubercular tissue is separated by considerable dense fibrous tissue. The muscular wall is partially destroyed, particularly in its inner half, where the muscular fibres are short and separated by fibrous tissue, small round-cell or tubercular infiltration. The tubercular infiltration is often formed into a miliary tubercle which rarely contains a giant-cell. In the outer half of the muscular wall no tubercular infiltration can be found, but fibrous tissue still separates bundles of muscle-fibres. The tube is surrounded, except at the attachment of the mesosalpinx, with a thin, irregular layer of fibrous tissue, perisalpingitis. In the distal third of the tube the sections show the lumen to be very large and containing in relation with the mucous-membrane edges an irregular line of caseating tissue. Here the mucous membrane is completely destroyed and replaced by a continuous ring of chronic fibroid tubercular tissue, with caseation toward the lumen-edges. The muscular wall is very thin and almost entirely converted into fibrous tissue, infiltrated with a few small round-cells. The tubercular disease in this tube, therefore, partially or completely destroys the mucous membrane and inner half of the muscular wall, and becomes progressively more extensive as the fimbriated extremity is approached. The mesosalpinx, except that it contains considerable fibrous tissue and small round-cell infiltration, shows nothing of interest. The parovarium is not included in the disease. Sections through the ovary show the oöphoron to contain a large number of follicular cysts and old corpora lutei, and here and there, widely distributed, a miliary tubercle, surrounded by a few small round-cells. In none of these miliary tubercles can a giant-cell be found, yet they are so characteristic from the arrangement of cells that they could not be mistaken for any other condition. The ovary is also covered by a capsule of fibrous tissue—perioöphoritis.

*Left side:* Sections made through the various portions of this tube

show the tubercular disease to be of the same character, but much more extensive. The mucous membrane is replaced by tubercular tissue in the distal and greater portion of the middle third. Caseation is more extensive and frequent, and is seen in all sections through the distal and middle thirds of the tube. Rugæ of mucous membrane, surrounded by intact columnar epithelium, are only found in the proximal third and inner half of the middle third. In the middle third these partially destroyed rugæ appear only in that half of the mucous membrane away from the muscular wall. The half of the mucous membrane in relation with the muscular wall is composed of a mass of tubercular tissue separated by fibrous or caseous tissue. In the muscular wall the muscle-fibres are more widely separated and the inner half is converted into fibrous tissue separating miliary tubercles. No miliary tubercles or epithelial infiltration can be found in the outer half of the muscular wall except on or just beneath the surface of the layer of fibrous tissue which surrounds the tube. These miliary tubercles on the surface of the tube are seen in only one of several sections. The mesosalpinx and parovarium show nothing of interest.

*The ovary.* Several sections made through this ovary show perhaps one-fourth of the oöphoron infiltrated with tubercular tissue and the remaining three-fourths showing the usual changes the result of chronic oöphoritis and perioöphoritis. The tubercular disease extensively infiltrated the stroma-tissue immediately surrounding an old, but large, corpus luteum, and is composed of an irregular circle of indefinitely outlined miliary tubercles containing one, two, or three giant-cells. Small round-cell infiltration is equally distributed in the tubercular tissue and does not definitely surround miliary tubercles. The giant-cells are very large and distinctly outlined. The tubercular disease described in these specimens is characterized by the large amount of fibrous tissue, the small round-cell infiltration, the indefinitely outlined miliary tubercles with very distinct giant-cells, mostly composed of central nuclei. It seems most probable, considering the more extensive destruction of the mucous membrane and presence of caseating tissue in distal third of each tube, that the primary infection took place in this portion of the tube and extended into the uterine cornu. That the ovaries were secondarily infected from each tube is almost positive, since the disease usually infects the tube first, and also because of the more extensive disease in the tubes. It is also very possible from this examination that the uterus formed part of the tubercular disease. The fact that the previous history of the patient and the physical examination revealed nothing suggesting the possibility of a primary tubercular lesion in any other part of the body, and that the miliary tubercles were translucent and more numerous in the pelvis, we think is sufficient evidence that the primary infection took place in one or both Fallopian tubes. Ten sections from each tube were carefully stained for tubercle-bacilli, but none was found.

These specimens, therefore, present chronic primary bilateral fibroid tubercular salpingitis or hydrosalpinx; secondary chronic bilateral fibroid tubercular oöphoritis with sclerocystic degenerative oöphoritis; bilateral perisalpingitis and perioöphoritis; and secondary tubercular peritonitis.

CASE IX.—A. S., German, aged forty years, housewife, married twenty years, nullipara, no miscarriages. Admitted to the University Hospital May, 1895. Menstruation first appeared at thirteen years



of age. She has had dysmenorrhœa from the beginning, but until a year ago the flow occurred every four weeks and lasted two days. For a year the flow has been very irregular and has at times continued several weeks. Three and a half years ago, immediately after lifting a heavy weight, she was seized with violent pain in the right iliac fossa. Since this time she has not been well, but has not lost in flesh. She has had a profuse leucorrhœal discharge for the last two years. She now complains of pain in both iliac fossæ, particularly the left, backache, headache, and almost continual hemorrhage from the vagina. Micturition is frequent and painful. The bowels are regular.

*Previous history.* She had the usual diseases of childhood. Twenty years ago she had a cough which lasted two years; since then, except for an attack of typhoid fever, twelve years ago, and her present symptoms, she has been in good health, able to do hard work as a housewife. In a careful physical examination no pulmonary or other lesions could be found.

*Family history.* Father is living and well, seventy-five years of age. Mother died at fifty-three years of age of cancer of the breast. Three brothers and two sisters are living and well; one brother died of phthisis. Husband is living and well.

Except that one brother died of phthisis, there is no history of tuberculosis.

*Vaginal examination.* External genitals negative. The uterus was small, virginal, and fixed in the pelvis by old, very dense inflammatory adhesions. Both tubes were enlarged and adherent.

*Celiotomy.* May 17, 1895. The omentum was found adherent to the abdominal parietes. The small and large intestine and rectum were attached to the left Fallopian tube by firm bands of adhesions. These adhesions were separated with very great difficulty, resulting in injury to the outer wall of the rectum and small intestine, which was repaired. Both tubes and ovaries were removed. A small amount of brown material having a fecal odor escaped from the left tube during operation. The pelvic cavity was washed out with a 1 : 2000 bichloride solution, a glass-drainage tube was introduced, and the abdomen closed. Convalescence was uneventful.

*Macroscopical examination of specimens.* The specimens consisted of the tube and ovary from both sides.

*Left side:* The tube measured 12 cm. in length, and from 0.5 cm. in the proximal third to 1 cm. in diameter in the distal third. It regularly and progressively enlarged as the fimbriated extremity was approached. The abdominal ostium was closed and no fimbriæ were to be seen. The entire surface of the tube, particularly posteriorly, was covered by dense organized adhesions, showing considerable laceration; a small opening had been torn into the lumen through the posterior surface of the distal third from which a small amount of muco-purulent fluid and caseous material having a fecal odor was escaping. The tube-wall was very much increased in hardness in every part. A hard body, evidently in the tube-lumen, could be felt at the junction of the middle and distal thirds. On section the lumen was found almost obliterated in the proximal third and enlarged, measuring 0.9 to 1 cm. in diameter, in the distal two-thirds. The hard body felt through the tube-wall was a calcified mass composed of five plates which measured from 0.2 to 1 cm. in diameter. On the proximal side of this mass the lumen was filled with semifluid caseous

or calcareous material. On the distal side it contained a small amount of caseous material and considerable muco-purulent fluid. The lumen was lined by an indefinitely defined irregular layer of what seemed to be chronic inflammatory tissue. No mucous-membrane folds could be recognized in any part of the tube. The muscular wall was very much hypertrophied, measuring 0.8 cm. in the middle third of the tube. The tube immediately surrounded the ovary and was bound to it by firm adhesions. The mesosalpinx was obliterated. The ovary was very small, 2.5 x 2 x 1 cm. in diameter, and, except that it was covered with adhesions and was almost stony-hard in consistency, it showed nothing pathological.

*Right side:* The tube from this side was completely covered with old adhesions, destroying the peritoneum and binding it firmly to the ovary, the ovary being in contact with at least one-third of the surface of the tube. It was not so large as that of the opposite side. It measured 10 cm. in length and from 0.5 to 0.9 cm. in diameter. The abdominal ostium was closed. It was stony-hard in consistency, and on section the wall seemed to be composed of dense fibrous tissue. The lumen was frequently obliterated in the proximal half, and in the distal half it was somewhat enlarged and contained a small amount of caseous material. It was also noticed that in making sections through the distal third that the knife frequently gave a grating sensation as the lumen was approached, showing that here also calcification was present. The ovary measured 3 x 2.5 x 1 cm. in its various diameters, and was also covered with adhesions and showed considerable sclerocystic degenerative oöphoritis. The plates removed from the left tube were treated with dilute HCl, profuse and immediate effervescence resulting, thus determining that they were due to calcareous infiltration. Macroscopically, these specimens present the lesions, except for the calcification-plate, which are sometimes seen in chronic simple pyosalpinx, the transitional stage between pyosalpinx and hydrosalpinx. There was nothing in their appearance, except perhaps that calcification more often occurs where tubercular disease is present, that could have suggested their true nature, and therefore it was unsuspected.

*Microscopical examination of specimens.* *Left side:* Sections made through all portions of the tube show chronic fibroid tuberculosis, except in immediate relation with the site from which the calcification-plates were removed, where the disease is generally of the chronic diffuse variety. The process is, as a rule, an unusually chronic one, fibrous tissue predominating in every section and tubercular tissue being seen only here and there in relation with the lumen-edges and widely distributed as a single small miliary tubercle in the muscular wall. No trace of mucous-membrane stroma is to be seen, and only rarely do columnar epithelial cells still exist. A few columnar cells are seen either imbedded in the tubercular tissue or surrounding spaces just within the destroyed muscular wall. In the distal two-thirds for a short distance surrounding the lumen which contained the calcification-plates there is an area of acute inflammation and diffuse tuberculosis. The miliary tubercles are here closely associated and surrounded by a very extensive small round-cell infiltration. Here, also, a small amount of caseation is seen. Leucocytes with multiple nuclei are very frequently noticed, and for some distance the surrounding tissue is composed of small round-cells. In other sections through this portion of the tube the miliary tubercles

which infiltrate the destroyed mucous membrane generally occur singly, surrounded by a very few small round-cells. They are separated by fibrous tissue and become less and less frequent toward the muscular wall. Frequently and particularly in relation with the lumen-edges a small area of calcification is to be seen. The giant-cells, which are often seen, are unusually large and have central nuclei. In the muscular wall the muscle-fibres are short and bundles are separated by dense fibrous tissue. Occasionally a small amount of epithelioid or small round-cell infiltration is seen equally distributed in the inner two-thirds of the muscular wall. Also, a small abscess is sometimes seen in this portion of the tube and most often just outside a bloodvessel-wall. Bloodvessels are much more numerous than is usual in the muscular wall. The outer third of the muscular wall, except for a small amount of fibrous tissue separating muscle-fibres, is normal. The tube is surrounded by a thin layer of dense fibrous tissue. Sections made through the proximal third of the tube show the lumen almost obliterated or divided by a band of fibrous tissue. The lumen is lined by a narrow layer of columnar epithelial cells. Surrounding the lumen for perhaps 0.1 cm. there is a layer of fibrous tissue. No tubercular tissue and only very few small round-cells are seen in relation with the tube-lumen. Beyond the layer of fibrous tissue the muscular wall is not so extensively destroyed as in other portions of the tube. It contains an abnormally large number of bloodvessels, and around the walls of these bloodvessels either an area of epithelioid infiltration, perhaps containing a giant-cell, an area of small round-cell infiltration, or a minute abscess is to be seen. The mesosalpinx is not involved in the tubercular disease, and shows nothing of interest. Sections made through the ovary show it to be almost entirely composed of old cicatrices. There are no developing follicles. No tubercular tissue can be found. The arterial walls in all specimens show sclerotic change, and in the ovary a few are atheromatous.

*Right side:* Sections made through every portion of this tube show the results of a very chronic inflammation. The lumen is filled with folds of mucous membrane, which have coalesced with each other or with a central portion of fibrous tissue. The stroma is often replaced by fibrous tissue, but in only one section through the tube in the distal third is any epithelioid infiltration to be seen. In the distal third the mucous-membrane folds are attached to a layer of calcification and the lumen is patent. The muscle-wall is mostly composed of dense fibrous tissue, the muscle-fibres having almost disappeared. Nowhere in the muscle-wall can tubercular tissue be seen. The ovary shows extensive sclerocystic degenerative oöphoritis. A very small amount of stroma-tissue and no developing follicles are to be seen; a distinct irregular layer of fibrous tissue surrounds the ovary and tube in all of the sections. Although a large number of sections were stained for tubercle-bacilli, none could be found. From this examination it is shown that the tubercular disease was almost entirely confined to the left tube, only a single section through the right tube showing epithelioid infiltration, and that the disease was the more extensive and acute in the distal two-thirds. It is, however, almost positive that the right tube had also been extensively infected; but through a conservative process the tubercular tissue was almost completely converted into fibrous tissue and calcareous infiltration. Although the disease in the tube was a very chronic fibroid variety of tuberculosis, the almost universal involvement of the



muscular wall with distributed tubercular infiltration, which generally immediately surrounded bloodvessels, makes it appear very probable that the peritoneum or other organs might have become secondarily infected. That the disease was primary unsuspected tuberculosis of the Fallopian tubes is self-evident.

These specimens, therefore, represent primary chronic bilateral tubercular salpingitis or pyosalpinx with calcification; bilateral chronic perisalpingitis, chronic oöphoritis of the left side; sclerocystic degenerative oöphoritis of the right side; and bilateral chronic perioöphoritis.

In three of these cases no diagnosis of tuberculosis of the Fallopian tubes was made before the operation. In Case VI. tubal tuberculosis was suspected because preliminary curetting had shown the presence of tuberculosis of the endometrium.

In Cases VII. and IX. there was nothing seen at the time of operation except, perhaps, the very strong adhesions, and the calcareous plates in Case IX., which would excite suspicion of tubal tuberculosis. In Case VIII. a probable diagnosis could be made from the presence of tuberculosis of the peritoneum.

In all these cases the tubercular disease seems to have been primary in the genital tract. There was no history of previous tuberculosis in any other part of the body. In Cases VII., VIII., and IX. it was primary in the Fallopian tubes.

In Case VI., though we may say that tuberculosis was primary in the genital tract, we cannot determine whether it began in the uterus or in the Fallopian tubes. In this case the husband had died of pulmonary tuberculosis. In Cases VIII. and IX. the husbands were living and well.

From a pathological standpoint these cases may be classed as follows :

1. Chronic fibroid tuberculosis of the corporeal endometrium extending into the uterine wall, and bilateral fibroid tubercular salpingitis.
2. Bilateral chronic diffuse miliary tubercular salpingitis or pyosalpinx, bilateral tubercular abscess, and chronic diffuse miliary tuberculosis of the ovaries.
3. Bilateral fibroid tubercular salpingitis or hydrosalpinx, bilateral fibroid tubercular oöphoritis, and secondary tubercular peritonitis.
4. Bilateral chronic tubercular salpingitis or pyosalpinx, with calcification.

STONES IN THE COMMON DUCT AND THEIR SURGICAL  
TREATMENT,WITH REMARKS ON THE BALL-VALVE ACTION OF FLOATING CHOLEDOCHUS-  
STONES.BY CHRISTIAN FENGER, M.D.,  
OF CHICAGO.

(Continued from page 156.)

ANATOMY. In attempting to outline the field of operation for the common duct, and its topographical anatomy, it must be remembered that when operating we do not have a normal duct to deal with, but a duct more or less dilated. I, therefore, think it justifiable to use the specimen here presented as a paradigm, and the exact anatomical relations between the organs in the hilus of the liver in this specimen will hold good for the majority of the cases of this kind with which we have to deal. I have found this to be the case in four out of five cases in which I have operated, and think it safe to conclude that the conditions about to be described will be those generally found. I will describe the organs in the position in which the operations are made; the patient lying on the table in the dorsal position and the anterior border of the liver held up by assistants, which makes its normally somewhat dependent position almost vertical; that is, the plane of the lower surface of the liver forms a right angle with the frontal plane of the body. Thus, the vertical position is changed, when the patient is upright, to a horizontal position. This does not change the relations of right to left, but changes the anterior or horizontal direction to a vertical or upright one, and *vice versa*. The vessels, bile-passages, and duodenum have been injected with colored paraffin. (See colored plates I and II.)

The organs to be considered are located between the two folds of the hepatico-duodenal ligament. This extends from the transverse sulcus, called the hilus of the liver, downward and consequently backward to the transverse colon, the duodenum, and the lesser curvature of the stomach, from right to left. Its right border is free and forms a free border between the posterior and anterior surface, being the free border of the entrance to the cavity of the lesser omentum, the anterior border of the so-called foramen of Winslow. The posterior surface is the anterior wall of the beginning of the lesser omental sac, and a finger introduced at this point will have the bile-ducts, vena porta, and hepatic artery on its anterior surface. The anterior surface of the ligament is covered with peritoneum from the large peritoneal cavity, continuous with the anterior surface of the greater omentum. When the index and third fingers of the left hand are passed into the foramen of Winslow

and the thumb laid on the anterior surface of the ligament, the organs in question will be between the ends of the fingers. The ligament is on the average 5 to 6 cm. long, 3 to 4 cm. broad; its direction, being the direction of the common duct, is oblique, and forms an angle of about  $54^{\circ}$  with the frontal plane of the body.

*Lymph-glands.* In the loose connective tissue below the anterior (lower) surface of the ligament are situated from two to four lymph-glands, usually somewhat enlarged; I have seen them as large as a walnut. The upper, anterior glands are situated on the vena porta; the lower, posterior ones on the anterior surface of the common duct. In the connective tissue in this locality and running in the direction of the common duct there are three or more branches of the vena porta 1 to 2 mm. in diameter, 3 to 4 cm. long, and two or three branches of the hepatic artery of the same length and about 1 mm. in diameter.

*Common Duct.* The common duct is 6 to 7 cm. long, runs in an oblique direction, forming an angle of  $45^{\circ}$  with the frontal plane of the body, and when it contains a stone or stones is ordinarily dilated. It is thus 15 to 20 mm. in diameter, and may be divided into three portions, each 2 to  $2\frac{1}{2}$  cm. long.

The upper or anterior portion, nearest the hilus, begins at the junction of the cystic and hepatic ducts. Its upper half is partially covered with the main trunk of the vena porta, which gradually retreats from its anterior to its posterior surface, to disappear behind the common duct at about its middle.

The middle portion has no vena porta on its anterior surface, but the upper half of the lower or right border is overlapped by the retreating vena porta. At its upper or left border the hepatic artery passes behind it on its way to the hilus of the liver, and at this point gives off a branch which passes forward on the anterior surface of the common duct, where it divides into two branches, one of which runs upward and to the right to the cystic duct, the other downward and to the left on the anterior surface of the lower half of the common duct. This middle portion of the common duct, the anterior surface of which is not in relation with the vena porta, is the place of choice for the incision in choledocholithotomy, as at this point only small branches of the vena porta and hepatic artery, as already described, are met with—vessels too small to cause serious or uncontrollable hemorrhage. Its upper border, together with the right free border of the duodenum and the hepatic artery, forms a triangular space.

The third, lower or posterior portion of the duct is almost entirely hidden by the duodenum which covers its anterior surface and its entire upper border for 2 to  $2\frac{1}{2}$  cm., while only 1 to  $1\frac{1}{2}$  cm. of its lower border is covered by the intestine. This part of the duct lies partly in the head of the pancreas. Its lower end is, as a rule, dilated and forms a



cul-de-sac, usually a little smaller than the duct higher up, and at some place in this cul-de-sac (the dilated diverticulum Vateri) the opening into the duodenum is situated. The possibility of passing a sound down into the intestine from the incised common duct depends upon the situation of the duodenal opening in this cul-de-sac, and upon the direction of the canal through the wall of the duodenum. In some cases it is easy to pass a sound down, in others impossible, although the opening may allow free exit to bile (this may be due to valve-formation or to the fact that the probe or bougie is caught in a fold). The head of the pancreas overlaps or comes down below the lower border of this portion of the duct for 1 cm. or more.

*Vena Porta.* The vena porta commences behind the pancreas, runs as a trunk 18 mm. in diameter from left to right, slightly upward, first, behind the middle portion of the common duct; about its middle it emerges on the lower or right border of the duct and runs from here upward and to the right for a distance of 3 to 3½ cm., when it divides into its hepatic branches. On its way it passes from the posterior surface around the lower border up on to the anterior surface of the upper portion of the duct and covers the lower part of this, extending to or a little upon the cystic duct. The terminal portion of the vena porta is situated on the anterior surface of, and consequently covers, the hepatic duct and its branches. Its termination is about 10 cm. above and to the right of the end of the cystic duct; in dividing, it gives off a main branch for the right lobe of the liver at an angle of about 110°, which passes downward and to the right. This main branch is 1½ cm. long and 10 to 12 mm. in diameter. From the place of division a branch for the quadrate lobe, 2 cm. long and 7 mm. in diameter, passes downward, backward, and a little to the left. At the left border and behind this branch is the bile duct for this territory of the liver, which is 3 mm. in diameter. Behind the bend and the upper border of the branch to the right lobe the upper border of the right branch of the hepatic duct comes into view. At the place where the trunk of the vena porta curves around from the lower upon the anterior surface of the common duct it takes up three other branches which run along this surface.

*Hepatic Artery.* From behind the pancreas, the hepatic artery, with a trunk 3 mm. in diameter, passes from left to right into the hepaticoduodenal ligament, for a distance of 15 mm. from the right border of the duodenum horizontally to the right until it reaches the common duct; then on its posterior surface into the hilus of the liver. When it reaches the common duct it gives off a branch which passes forward to the anterior surface of the common duct. This branch soon divides into two or three smaller branches, one running upward and to the right for the upper part of the common duct and the cystic duct, the others down-

ward and to the left to supply the middle and lower portions of the common duct.

*Cystic Duct.* The cystic duct is about 4 cm. long; its lower half, which runs upward and to the right in the direction of the common duct, is 10 mm. in diameter, but gradually diminishes until its diameter is only 4 mm. Its upper portion runs vertically, forming an obtuse angle with the lower portion, the concavity being to the left. At its entrance into the gall-bladder in this specimen it is only 3 mm. in diameter. (In the specimen here described a round diverticulum, thin-walled, 2 cm. in diameter, was found upon its upper vertical portion.) The upper or distal half of the cystic duct may be incised in a vertical direction for the removal of stone at any place in its extent without wounding the vena porta; the lower or proximal half should be incised for stone as far from its lower or right border as possible so as to avoid wounding the vena porta.

*Hepatic Duct and its Branches.* The hepatic duct goes off from the common duct at the same place as the cystic duct and bends backward behind the latter and behind the vena porta and its branches. It is  $2\frac{1}{2}$  to 3 centimetres long, passes to the right, downward and backward, and then divides into the branches for the liver. The upper border of the upper anterior branch to the right lobe can be seen behind and over the border of the vena porta. The branch to the quadrate lobe can be seen to the left behind the corresponding branch of the vena porta. The hepatic duct is thus situated behind and is covered by the cystic duct and the vena porta. A stone in this duct can therefore scarcely be felt from the anterior surface through these two organs, and when a floating stone is pushed or passes up here it apparently disappears into the liver, and search and manipulation are required to bring it again down into the common duct.

*Gall-bladder.* The gall-bladder, when distended, is pear-shaped, with its fundus toward the free border of the liver which, in its normal condition, it never overlaps, so that it can never be felt when the condition of the patient is normal (Rheinstein). It is from 8 to 14 cm. long and 3 cm. in diameter. At the entrance to the cystic duct it narrows down to 3 mm. in diameter. When retracted and atrophic from inflammation or protracted emptiness and disuse, as in the specimen here described, it may shrink to a length of 4 cm. and to a diameter of  $1\frac{1}{2}$  cm., or, as in Case V., to even smaller dimensions.

REMARKS. The descriptive anatomy as detailed in the text- and hand-books differs to a great extent from that just given, partly because of the pathological condition of the specimen described—the dilatation of the common and hepatic ducts and the atrophy of the gall-bladder; but at the same time the position of the vena porta in its relation to the bile-ducts is so different from that given by Henle that I hardly think that

the entire difference can be due to the pathological condition. Henle says (page 200): "The common duct is situated at the right free border of the hepatico-duodenal ligament or at the free border which forms the fold at the entrance of the foramen of Winslow. The hepatic artery is situated on its left side close to it, and behind both lies the vena porta."

These are entirely different relations between the upper part of the common duct, and particularly the hepatic duct, from those found by me, and would naturally lead to the conclusion that any of these ducts might be incised without risk of opening into the vena porta. From the relations described by me it will be seen that a stone in the hepatic duct cannot be cut down upon without passing through the vena porta, with the exception, perhaps, of a small place at the beginning of the duct and behind the cystic duct. In the upper half of the common duct it is unsafe to incise close to the free border of the hepatico-duodenal ligament, because the vena porta here may overlap the right or lower border of the common duct; and it is only the lower half of the common duct that lies close to the free border of the ligament, entirely covering the vena porta. Thus only the lower or right half of the common duct can be incised without danger of opening into the vena porta.

**PATHOLOGY.** It has been the general belief that most of the choledochus-stones are formed in the gall-bladder and pass secondarily through the cystic duct down into the common duct. We also know that stones form in the hepatic branches and consequently, in all probability, also in the hepatic and common ducts. In 62 out of 150 cases, one or more stones were found in the common duct alone. In the remaining 88 cases stones were found simultaneously in one or more of the biliary passages. (Courvoisier.)

The stones in the common duct are ordinarily from 1 to 2 cm. in diameter; that is, they are on the average larger than the stones in the gall-bladder. In two-thirds of the cases only one stone has been found; in the remainder from two to six, but seldom in large number. The shape is usually oval, more rarely globular or irregular.

The locality in the common duct where the stones are found (according to Courvoisier) is, in 67 per cent. of the cases, the lower or duodenal portion, in about 15 per cent. in the upper or hepatic portion, and in the remaining 18 per cent. in the middle portion. I think it is singular that Courvoisier devotes so little attention to floating stones. He says: "The stone was sometimes—in 5 cases only out of 150—found movable in both directions in its cul-de-sac," but does not seem to appreciate that a stone might float through the entire common duct. As he makes his deductions from the literature, it is likely that other authors have overlooked the mobility of the stones in many cases and have simply noted the place where the stone was found, paying no attention whatever to the ease with which it could be moved; for instance, from the



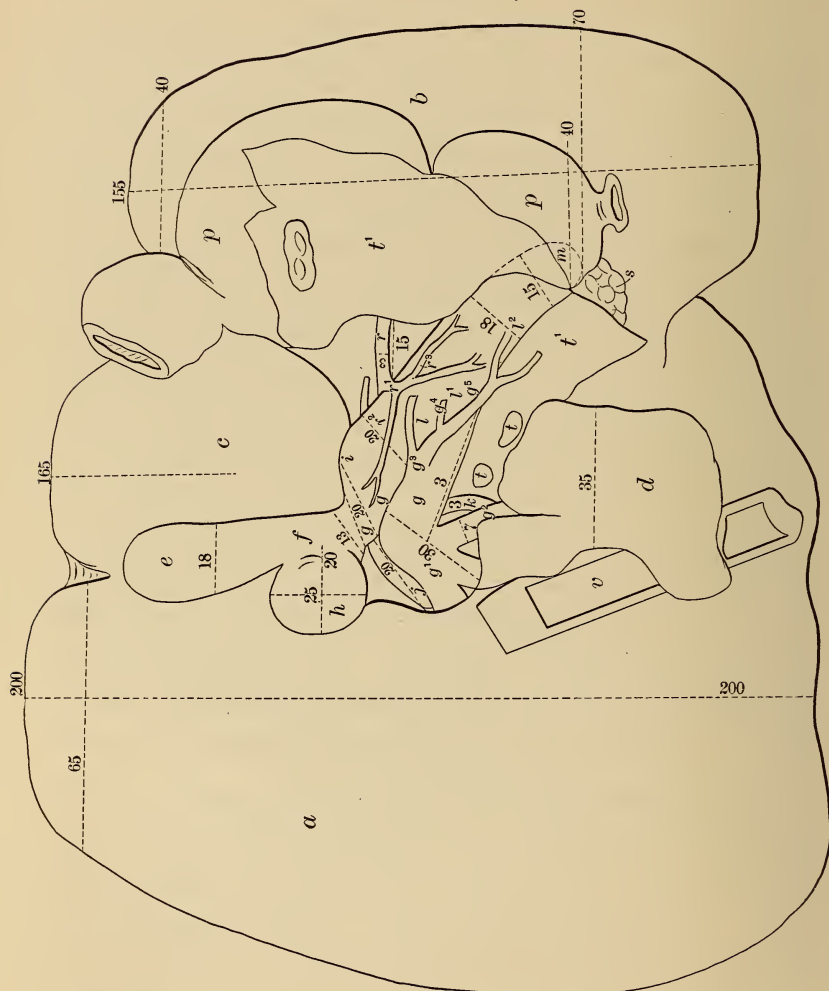
more narrow duodenal portion up into the wider upper territory of the common duct.

The natural and usual effect of a stone in the common duct is occlusion to the passage of bile and subsequent dilatation of the biliary passages in a proximal direction. Dilatation of the common duct was noted in 47 out of 200 cases. The duct was dilated from the size of the thumb up to 2 to 4 cm. in diameter. It was rarely—in 14 cases only—dilated to a large cyst-like cavity. The hepatic duct and its intrahepatic branches were found dilated in 25 per cent. of the cases. While it was always believed previously that the gall-bladder would be found dilated in cases of obstruction from choledochus-stones, Courvoisier found, in 1890, to his great surprise, that the gall-bladder was atrophic and more or less empty in 80 per cent. of the cases of choledochus-stone and dilated in only 20 per cent. He explains this curious fact in the following manner: Supposing the stones are found in the gall-bladder and have secondarily emigrated to the common duct, they have caused while in the gall-bladder a chronic inflammation of its walls, terminating in retraction and atrophy. In support of this view, he mentions cases in which local losses of substance or cicatricial territories indicated pre-existing gall-stones. But in many cases such traces of local injury are not found; the cystic duct is open and normal. The atrophy in these cases, hitherto incomprehensible, is easily explained by the ball-valve action of a floating choledochus-stone at the distal end of the cystic duct, as described above. This atrophy of the gall-bladder is, as Courvoisier has rightly pointed out, so characteristic for choledochus-stone that it is a valuable symptom in the differential diagnosis between stone and other causes of occlusion of the common duct.

Out of 35 operations for obstruction of the common duct, collected by Courvoisier, 17 were on account of stone and 18 on account of non-calculous obstructions, strictures, tumors, obstructions within or outside of the duct, etc. In 4 of the 17 cases of stone the gall-bladder was dilated; in 13 it was atrophic. In the 18 cases of non-calculous obstruction the gall-bladder was dilated in 16, and in only 2 was there no ectasia.

The contents of the dilated biliary passages is ordinarily bile, either normal, light yellow, or thickened and dark. Pus was found in only a minority of the cases; empyema of the gall-bladder in 8 cases; empyema of the bile-ducts—that is, suppurative cholangitis—in 5 cases; and these conditions combined, in 5 out of a total of 18 cases. In 10 cases only, the dilated biliary passages contained no bile, but either watery, colorless, or slightly mucoid fluid bearing no resemblance to bile, a condition of acholia ascribed to pressure-atrophy of the liver-cells, depriving them of the faculty of manufacturing bile. In all the 10 cases collected by Courvoisier, not one case of gall-stone was found,

## KEY TO PLATE I.



*a.* Right lobe. *b.* Left lobe. *c.* Quadrate lobe. *d.* Lobus Spigelii. *e.* Gall-bladder. *f.* Upper vertical portion of cystic duct. *g.* Lower oblique portion of cystic duct. *h.* Diverticulum in upper portion of cystic duct. *i.* Hepatic duct. *j.* Branch of hepatic duct to right lobe. *k.* Branch of hepatic duct to lobus Spigelii. *l.* Common duct, upper portion. *l'*. Common duct, medial portion. *l''.* Common duct, lower portion. *m.* Diverticulum of Vater. *p.* Duodenum. *q.* Vena porta. *q*<sup>1</sup>. Vena porta branch to right lobe. *q*<sup>2</sup>. Vena porta branch to lobus Spigelii. *q*<sup>3</sup>. Vena porta branch taking up—*q*<sup>4</sup>, *q*<sup>5</sup>. Smaller branches of vena porta from anterior surface of common duct located in hepatico-duodenal ligament below its anterior peritoneal surface. *r.* Trunk of hepatic artery. *r*<sup>1</sup>. Branch of hepatic artery to anterior surface of common duct giving off—*r*<sup>2</sup>. Branch of hepatic and cystic ducts, and *r*<sup>3</sup>. Branch of lower half of common duct. *s.* Pancreas. *t.* Lymph-glands in hepatico-duodenal ligament. *t*<sup>1</sup>. Peritoneal surface of hepatico-duodenal ligament divided and dissected off from vena porta and common duct. *v.* Vena cava inferior.



PLATE I.





but tumors in or outside of the duct, and in 1 case pyæmia was observed.

The relation of the icterus to "gall-stone disease," or gall-stone in the different parts of the bile-passages, is as follows:—

Stones in the gall-bladder cause no icterus (the so-called "gall-stone colic" is suppuration of the gall-bladder).

Stones in the cystic duct—

(a) In the upper proximal half cause no icterus.

(b) In the lower distal half may cause icterus from compression of the hepatic duct.

Stone in the common duct causes icterus by impaction, obstruction, or ball-valve action.

Stone in the hepatic duct causes icterus when impacted in a narrow duct.

**SYMPTOMS.** In the attempt to build up a special group of symptoms characteristic for stone in the common duct we are confronted with certain difficulties:—

1. In nearly one-half of the cases stones are present not only in the common duct, but also in some other portions of the biliary passages.

2. Very few authors have attempted to separate the cases of choledochus-stone, as a distinct group, from the general gall-stone group, but have given the symptoms of the entire class. Courvoisier was, I believe, one of the first to make a separate classification, and I agree with him that it is possible to differentiate choledochus-stone as a distinct class, by means of a somewhat characteristic group of symptoms:

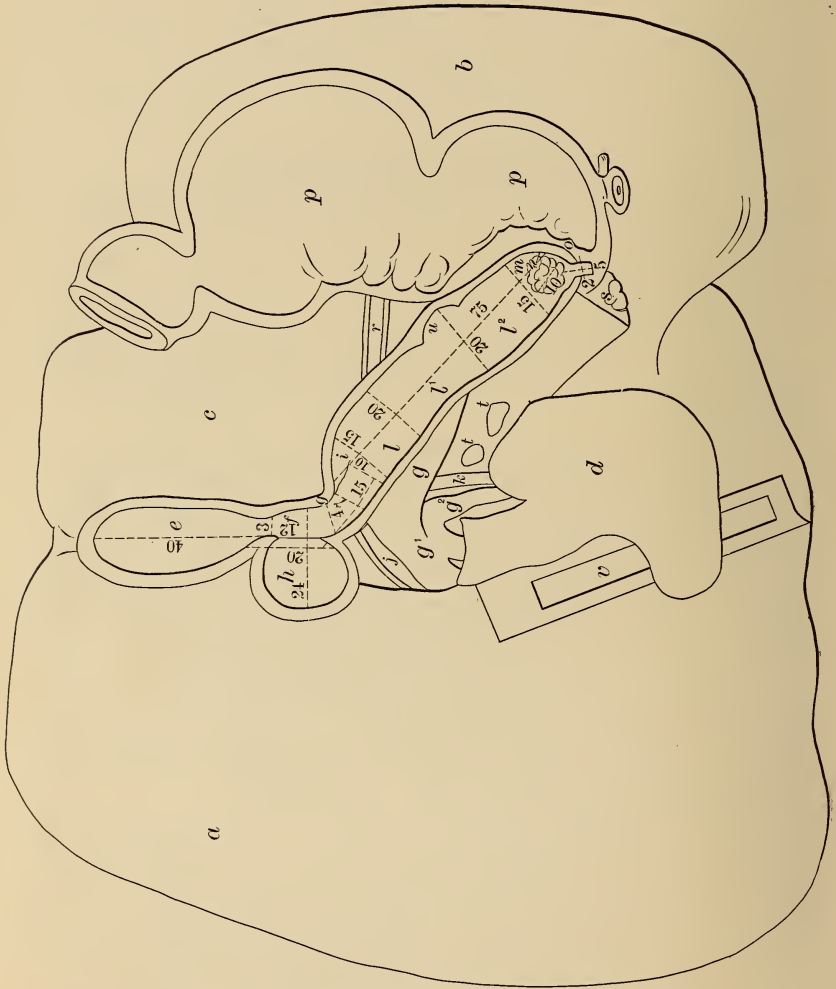
1. *Gall-bladder.* The condition of the gall-bladder, as has already been stated, furnishes valuable information. Atrophy, or at least absence of tumor, abscess, or local tenderness in this locality, is characteristic for uncomplicated choledochus-stone. (Courvoisier.)

2. *Icterus.* The most important, or, as Courvoisier avers, the cardinal symptom in choledochus-obstruction is icterus. It must be present when obstruction occurs. Multiple small stones may not obstruct the flow of bile, but larger stones will do so, either by occlusion of the lumen of the duct or by ball-valve action. And one very small stone may, as in Case V., cause intermittent obstruction by ball-valve action.

The icterus is rarely continuous and equal in intensity for a long time, because a large stone is seldom permanently wedged in the duct. In cases of choledochus-stone the icterus is ordinarily intermittent or remittent.

(a) *Intermittent Attacks of Icterus.* A few attacks of relatively short duration, separated by free intervals of months or years, are found in 25 per cent. of the cases of choledochus-stone. This probably signifies passage of gall-stones into the duodenum. It is the classic gall-stone colic with icterus, and is consequently characteristic, not of a larger stone remaining in the duct, but of smaller stones passing out. The

## KEY TO PLATE II.



*a.* Right lobe. *b.* Left lobe. *c.* Quadrate lobe. *d.* Lobus Spigelii. *e.* Gall-bladder. *f.* Upper vertical portion of cystic duct. *g.* Lower oblique portion of cystic duct. *h.* Diverticulum in upper portion of cystic duct. *i.* Hepatic duct. *j.* Branch of hepatic duct to right lobe. *k.* Branch of hepatic duct to lobus Spigelii. *l.* Common duct, upper portion. *l'.* Common duct, medial portion. *l''.* Common duct, lower or duodenal portion. *m.* Diverticulum of Vater. *n.* Stone in diverticulum. *o.* Duodenal opening of common duct. *p.* Duodenum. *q.* Vena porta. *q¹.* Vena porta branch to right lobe. *q².* Vena porta branch to lobus Spigelii. *r.* Trunk of hepatic artery. *s.* Pancreas. *t.* Lymph-glands in hepatico-duodenal ligament. *u.* Diverticulum in common duct. *v.* Vena cava inferior.



PLATE II.





occurrence of icterus with colic as a distinct, rare attack occurring occasionally in the history of choledochus-stone, speaks for gall-stone disease in general, as compared with other causes of obstruction, such as tumor, compression, stenosis, etc.

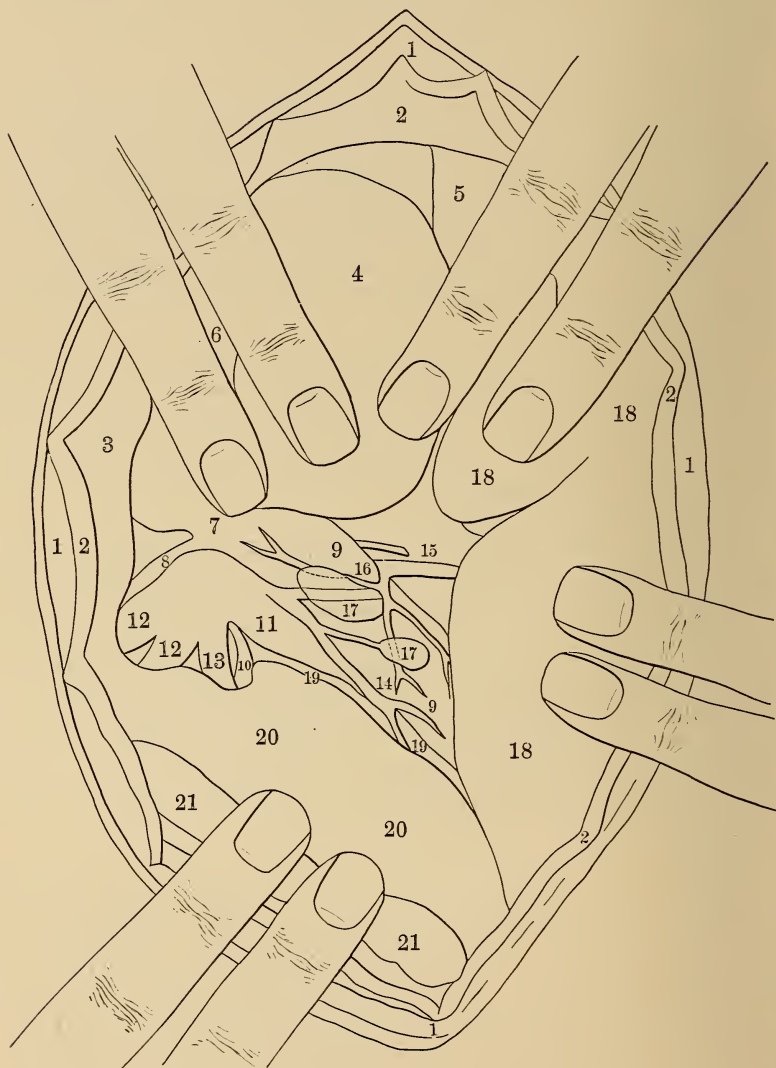
(b) *Remittent Icterus*, on the other hand, slight, and, as we might say, incomplete attacks of icterus, occurring as often as once or twice a week, is characteristic of stone in the common duct, and, in my opinion, of floating choledochus-stone. This remittance is such that the icterus varies in intensity. In the short interval between attacks of complete occlusion, with a day or two of clay-colored stools, followed by the presence of bile in the passages, the skin becomes less yellow, but another occlusion takes place before the icteric color has had time to disappear entirely.

In rare cases the icterus may temporarily disappear because of a longer interval between attacks, or because of a shorter period of occlusion—one day, for example. In such cases the icterus is incomplete, the skin may be yellowish, but the conjunctiva normal, with bile in the urine, and the interval may be sufficiently long to allow even this slight icterus to disappear temporarily.

Cruveilhier gives the following explanation of remittent icterus: During the attack of complete icterus with clay-colored stools the stone is tightly grasped by or wedged in the wall of the common duct, and complete occlusion occurs. Accumulation of bile on the proximal or liver side of the stone causes dilatation of the duct on this side, the wall is pressed away from the stone, some bile is thereby permitted to pass down, and a state of incomplete occlusion ensues with bile-colored stools and decrease of the icterus. The distention of the duct on the proximal side of the stone subsides, the wall again contracts closely over the stone, and the preparation for another exacerbation is now complete.

Courvoisier found in the literature 12 cases of this form of remittent icterus in which autopsies were obtained; in 9 cases choledochus-stone was found, and in 3 a tumor was found in the duct. He thinks that Cruveilhier is right, and considers his explanation "plausible" for the cases of tumor in the duct and for some cases of single or multiple large stone when immovably fixed or situated in a locally dilated portion of the duct. His explanation cannot, however, in my opinion be accepted for small stones, when a stone, for example, 1 cm. in diameter, is located in a duct 2 cm. in diameter, or when a stone is present which is movable or floating not only during the attack of icterus (as in my Case I.), but also during the intervals between attacks (as in the cases in which I operated). In such cases, and I believe them to be vastly in the majority, the frequency of the attacks of incomplete icterus or the remit-

## KEY TO PLATE III.

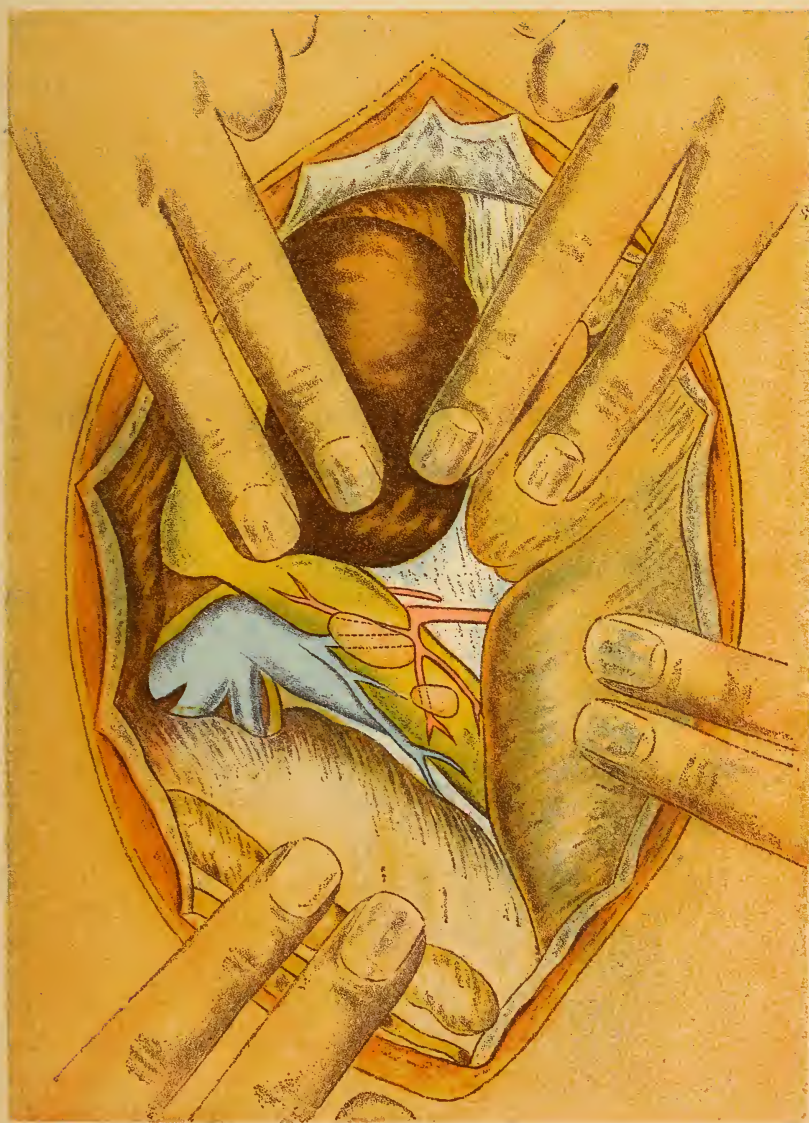


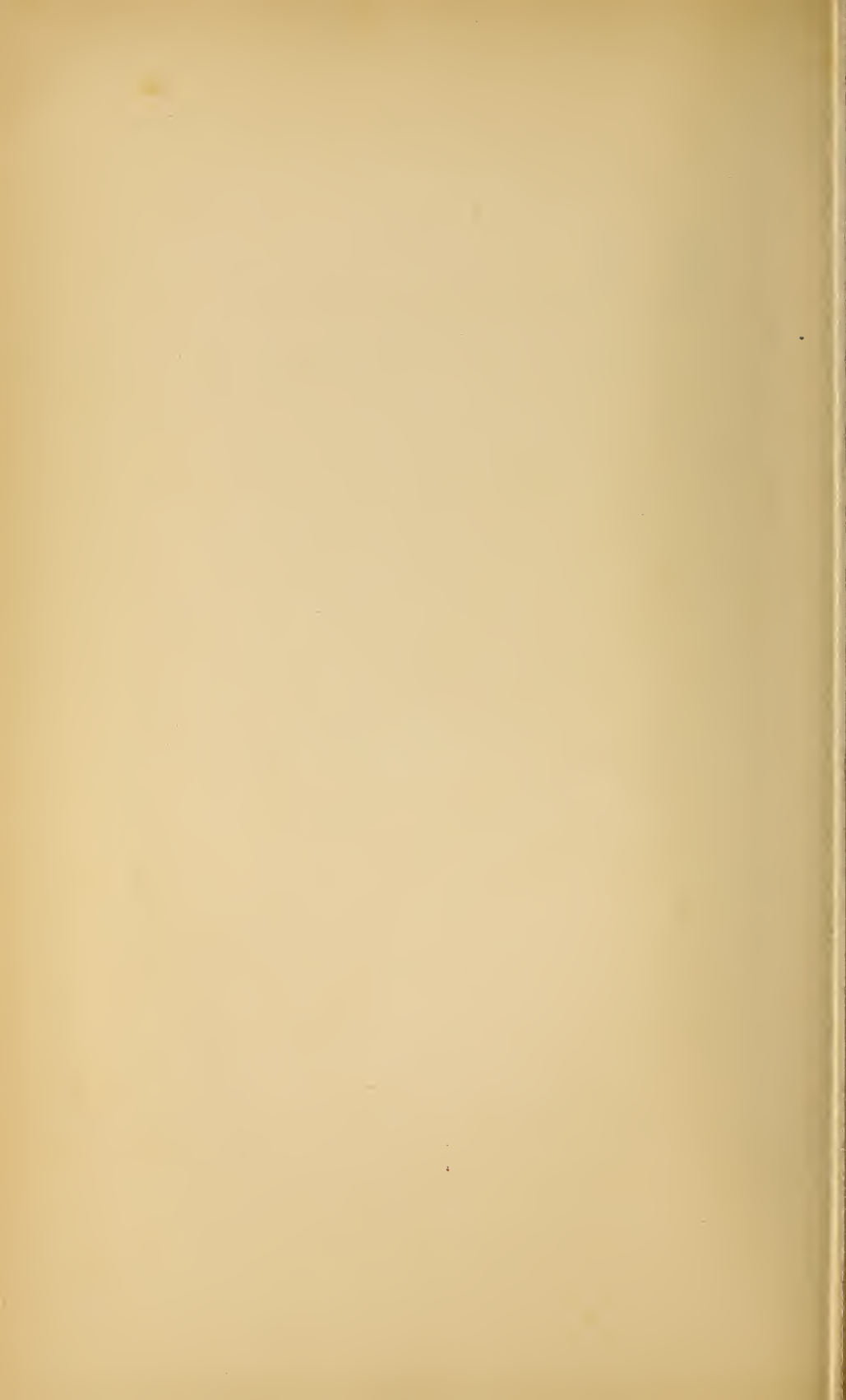
FIELD OF OPERATION.

1. Wound through abdominal wall. 2. Parietal peritoneum sutured to skin. 3. Right lobe of liver, lower surface. 4. Quadrate lobe of liver. 5. Suspensory ligament of liver. 6. Gall-bladder. 7. Cystic duct. 8. Hepatic duct. 9. Common duct. 10. Branch of hepatic duct to lobus Spigelii. 11. Trunk of vena porta. 12. Branches of vena porta to right lobe. 13. Branches of vena porta to lobus Spigelii. 14. Small branch of vena porta in hepatico-duodenal ligament. 15. Hepatic artery. 16. Branches of hepatic artery to hepatico-duodenal ligament. 17. Lymph-glands in hepatico-duodenal ligament. 18. Duodenum. 19. Entrance to foramen of Winslow. 20. Hepatico-colic ligament. 21. Transverse colon.



PLATE III.





tence of the icterus cannot be explained in any other way than by ball-valve action.

The exacerbation in the remittent icterus not infrequently follows a heavy meal. A distended stomach adherent to the hilus of the liver or the wall of the gall-bladder, as we so often find it in these cases, is likely so to displace the floating stone as to bring on an attack, by pushing the stone down into the cul-de-sac in the duodenal end of the duct, the diverticulum of Vater.

If Courvoisier's explanation is correct, the increased secretion of bile following a heavy meal would act in an opposite manner and would cause an existing attack to disappear by permitting some bile to pass by the obstructing stone.

I might even go so far as to say that the frequently repeated incomplete attacks of icterus—the remittent icterus—rather indicate choledochus-stone and ball-valve action from a floating stone.

Is icterus present in cholelithiasis outside of the common and hepatic ducts? In stones of the gall-bladder with or without inflammation it is not present. If the stone enter the dilated cystic duct, it may, by its size or possibly by pericystic inflammation, cause compression of the hepatic duct and icterus. This would explain those cases of stone in the gall-bladder in which icterus is present and removal of the stones by cholecystotomy effects a cure. In some cases the cystic duct might be large enough to permit the stones to float down into the common duct and back into the gall-bladder. Remittent icterus would, of course, be expected in such cases.

Continuous or remittent icterus persisting for years may be caused by stone or by non-calculous occlusion. If the icterus exists for two or more years without cachexia, it is probably due to stone, because a malignant tumor in the duct or duodenum would cause death in a shorter time. Lawson Tait states that intense icterus lasting for years speaks for stone in contradistinction to tumor. Courvoisier, from his investigation of the literature, arrives at a diametrically opposite conclusion. Intense and continuous icterus on the whole speaks for tumor; but Lawson Tait is correct in stating that icterus extending over a number of years is presumptive evidence of stone. This explanation will render possible the reconciliation of the opinions of both these authors.

3. *Colic.* It is generally conceded that colic is a capital symptom of stone in the biliary passages. In eighty cases of obstruction from choledochus-stones collected by Courvoisier he found colic in 51, or 63.7 per cent.; the symptom was not mentioned in 19, or 23.7 per cent.; and it was positively stated to be absent in 10, or 12.5 per cent. In seventy-four cases of obstruction from tumors colic was noted in only 9 cases, or 12.2 per cent., and was absent in 65, or 87.8 per cent. Thus it will

be seen that colic speaks strongly for choledochus-stone as the cause of occlusion, as opposed to tumors.

Preceding attacks of colic indicate choledochus-stone which has passed into the duodenum. Courvoisier states that in fifty-one cases of choledochus-stone colic stones were found in the feces in only five cases.

Colic is a natural companion to icterus of sudden onset, but continued attacks of colic and icterus speak for occlusion from stone in the common duct, either temporary, when the stone passes down into the duodenum, which is relatively rare; remittent, in floating choledochus-stones, which is common; or, finally, permanent, when the stone is impacted and causes complete, permanent occlusion, which is also rare.

4. *Localization of Pain.* In the cases of stone in the common duct the pain, according to my observation, is seldom localized in the region of the gall-bladder or in the right hypochondrium, unless concomitant inflammation of the gall-bladder, caused by stones in that viscus, is present. I found the pain located in the epigastrium in Cases II., III., and V.; in III. and V. there was simultaneous pain in the region of the gall-bladder. The pain was located in both lumbar regions in Case VI.; equally in both hypochondriac regions in Cases V. and VI.; and in the lower part of the back or lower dorsal region in Cases I., II., III., and VI. I consider this localization of pain outside of the gall-bladder as a characteristic symptom of floating choledochus-stone.

5. *Remittent Pain.* The frequent remittance of pain, either slow or sudden in onset, and suddenly disappearing, attended by a flow of bile, but with no stone in the feces, signifies a single stone or a few stones that do not pass through, but float in a dilated common duct. The attacks of colic or pain in the course of the disease become more and more frequent, from once or twice a month to once or twice a week, and in some cases even daily. In Case II. the attack of pain lasted for ten hours; in Case V. from half an hour to two hours.

6. *Vomiting.* Vomiting was present in Cases I., II., III., and V. In Case VI. the patient experienced relief from vomiting, so much so that she was accustomed to force vomiting in order to gain relief from the pain.

7. *Relief of Pain in Certain Positions.* The pain is frequently relieved and the attack brought to an end by changes of position, which probably displace the floating stone, or by the maintenance of some one position. In Case IV. the patient obtained relief by lying on the stomach; in Case VI. by inducing vomiting; in Case V. by flexing the thighs upon the abdomen.

8. *Loss of Weight.* An important and characteristic symptom I have found to be the rapid and considerable loss of weight, which cannot be explained by fever, as fever is either absent or only of slight degree; by sepsis in the bile, as the bile may be aseptic, as in Case IV.; or by the



severity of the icterus, as icterus is frequently slight, and as the feces are intermittently or generally bile-colored. The loss of weight must, in my opinion, be attributed to intermittent, frequent ptomaine-intoxication—that is, bile-absorption, as well as to disturbed digestion.

The loss of weight is characteristic and rapid, and after the operation the patient rapidly regains weight. In Case I. the loss of weight was sixty pounds; in Case II. the patient lost fifteen pounds in ten weeks, but after the operation gained fifty pounds in three months; in Case III. the patient lost fifty pounds, and after the operation gained twenty pounds in three months; in Case IV. the patient lost twenty-five pounds in seventeen days, and after the operation gained forty pounds in forty days; in Case V. the patient lost twenty-three pounds; and in Case VI. the patient lost fifty-three pounds, and since the operation has gained thirty-eight pounds in weight. In Czerny's Case XX., reported by Mermann, the patient lost thirty-six pounds, and after the operation gained forty pounds in nine months; in Case XXI. the patient gained four pounds in one month after the operation; and in Case XXII. there was a loss of weight of twenty-five pounds.

9. *Fever.* Intermittent or remittent biliary fever ordinarily follows or precedes the attacks of colic and icterus. It is not yet decided whether this rise in temperature is due to absorption of retained aseptic bile, or whether the microbic invasion from the intestine, which infects the bile, causes inflammation of the wall of the duct, thus making the fever septic. Charcot described an intermittent hepatic fever due to absorption of retained aseptic bile. Schüppel is inclined to believe that inflammation—that is, infection from microbes—is essential in the causation of fever. Courvoisier, after analyzing the cases collected from the literature, found fever in 25 per cent. of the cases of occlusion from stone, and only in 10 per cent. of the cases of occlusion due to other causes. In all these latter cases he found a well-defined microbic cause for the fever. He, therefore, accepts Schüppel's opinion in this regard. Acorimbini believes that the fever is caused by bacteria which enter the bile-passages from the duodenum or from the circulation. He states that the bacterium coli communis is normally found in the bile-passages, and is a factor in the formation of gall-stones. The bacteria cause a desquamative angiocholitis (Dujardin-Beaumetz, Mosler, Naunyn), and the stone contains the colon-bacillus throughout its mass. When the stone has formed it causes abrasion of the epithelium of the ducts, and the microbes enter and cause inflammation of the wall, which leads to the plastic peritonitis which causes the formation of adhesions between the peritoneal surfaces of the ducts and the surrounding organs.

It seems to me, however, that we cannot positively deny the possibility of a rise in temperature due to the absorption of aseptic bile caused by sudden retention from obstruction due to stone. The fever, according



to R. Schmitz, sometimes precedes the colic, and is consequently the earliest symptom of occlusion. If bacterial infection and inflammation of the wall of the ducts cause the fever, why should it cease with the removal of the obstruction? If infection of the bile contained in the biliary passages, the bile being the culture-medium for the bacteria contained in the stone, and if the ptomaines thereby produced cause the fever by their absorption, why should the fever in some cases be the earliest symptom, even preceding the pain caused by the obstruction? Furthermore, would we not expect to find in all cases of stone causing remittent attacks of fever that the bile contained some of the microbes, even the most innocent, the colon-bacillus? In my Case IV. the bile from the common duct was sterile, and yet the attacks of retention were always accompanied by marked fever.

**OPERATION.** Many operations have been employed for the removal of stone in the common duct.

Indirect lithotripsy, crushing, leaves débris, some of which may remain in a pouch in the duct, increase in size, and, as the stone is always a bacterial depot, may cause inflammation of the wall or even cholangitis.

Cholecystenterostomy, the formation of an anastomosis between the gall-bladder and the jejunum, is only possible when the cystic duct is patent.

Choledochoduodenostomy is more generally applicable, but it does not remove the stone, and consequently does not remove the cause of septic inflammation, even if it removes the retention of bile and icterus. A patient of Körte's died from cholangitis caused by a choledochus-stone, notwithstanding the existence of a duodenal fistula which permitted free egress to the bile.

Cholecystenterostomy is an operation of necessity when the obstruction cannot be found or removed. It is never an operation of choice, and will very rarely be called for in cases of choledochus-stone.

Cholecystotomy. It is only in rare cases that a choledochus-stone can be removed through the gall-bladder; namely, when the cystic duct is so dilated as to permit the passage of the stones back into the gall-bladder or of a forceps down to grasp or crush the stones. It is impossible, however, to be sure of removing all of the multiple floating stones through the gall-bladder, as the exploration of the common duct through its lumen can be accomplished only very imperfectly by a sound or probe through the gall-bladder.

Perfect, thorough exploration of the common duct should be made by the finger, and should extend up into the hepatic duct, and this can be accomplished only by choledochotomy and exploration through the opening thus made.

The only remaining operation of choice, which has a legitimate field, but is rarely called for, is the trans-duodenal incision over a stone in

the dilated diverticulum of Vater. One case of this kind is reported by Pozzi and one by McBurney.

Internal choledochotomy, division of strictures in the common duct through an opening in the gall-bladder, a successful case of which Abbé has reported, is rarely applicable and is a dangerous procedure, as it is an operation in the dark, and there is grave danger of wounding the vena porta or the hepatic artery. My preference in such cases would be to make an external choledochotomy and then deal with the stricture.

Choledochotomy, the choledocholithotomy of Courvoisier, the excision of the gall-stone from the ductus choledochus, is the operation of choice, which is most commonly indicated, and which effects the most complete cure. This operation was proposed by Langenbuch in 1884. Charles T. Parkes, of Chicago, also spoke of the operation in 1885, and proposed to leave the duct open and drain it by means of a rubber drainage-tube, or to close the opening in the duct by sutures. KümmeI, in 1890, stated that several years before, about the time Langenbuch proposed the operation of cholecystectomy, he had a patient, a woman of forty years, in whom, after having extirpated the gall-bladder, he found a choledochus-stone the size of a walnut in the dilated common duct. He incised the duct, removed the stone, and closed the opening with sutures. The operation was long and severe, and the patient died twenty hours after. (Courvoisier.)

Courvoisier was the first to perform choledocholithotomy. He had made the diagnosis of choledochus-stone, and had planned the operation beforehand. He made the first operation on January 22, 1890; operated on a second patient February 18, 1890, and on a third on March 17, 1890, and all three of these operations were successful.

The remarkable success achieved by Courvoisier immediately secured for choledocholithotomy a place in the front rank of the operations for choledochus-stone.

In 1892 Martig had already collected 27 cases, and in 1895 Mermann collected 17 additional, making a total of 44 cases of choledochotomy, with a mortality of 18 per cent.

Technique of choledocholithotomy. The operation is not always easy and requires at the least one to two hours for its performance. The wound is necessarily deep, and the operating on the duct has to be done at the bottom of the wound. The liver is often swollen and hard, and adhesions are almost always present. Good light is absolutely essential. (Mermann.) I prefer daylight to artificial light. Skilled assistants are necessary, as the liver must be lifted and held up, preferably, by the fingers of an assistant. I prefer this to the method proposed by Studsgaard, who had the liver held up by means of a loop of silk passed through the liver-tissue near the border of the organ. (See Plate III.)

A. *Incision.* An incision of ample length is required in order to secure operating-space, and it is often necessary to supplement the longitudinal lateral incision with a transverse horizontal one. (Czerny.) The peritoneum should then be sutured to the skin.

B. *Adhesions.* After the introduction of large flat sponges, the adhesions between the gall-bladder, stomach, transverse colon, and the greater omentum, which are common, should be separated. These organs, together with the duodenum, are often adherent to the common duct. These adhesions are often band-like and comparatively easy to loosen, either by blunt dissection or by division between ligatures, but they necessarily prolong the operation. In some cases, fortunately rather rare, the duct is found buried in such extensive and firm masses of cicatricial tissue that it is impossible to isolate it or even to find the stone. Thus Körte reports two cases of attempted choledochotomy in which he was unable to isolate the common duct, and could not find the stone. At the autopsy on the first case he found, but not until he had removed the liver from the body and laid it upon the table, a small stone in a parietal dilatation of the common duct. In the second case he tried at the autopsy, first, to find the stone through the wound of operation, but in vain, and it was not until the liver and surrounding organs had been removed and laid upon the table for dissection that he was able to find a stone the size of a bean in the common duct, which was firmly adherent to the surrounding organs.

C. *Examination of the gall-bladder.* After isolation of the gall-bladder from the adherent organs it is usually found to be small, atrophic, and empty; it may even be obliterated, but no reports of this condition are on record. Prof. Frank Billings has, however, told me of two cases when he was present at the operation, in which this condition was found. In rare cases it is found to be dilated. A distended gall-bladder should be emptied by aspiration. When stones are found in the gall-bladder and in the common duct the stones in the former must be removed by cholecystotomy. I think it sufficient to open the gall-bladder only when a stone can be felt through its wall. Czerny (Mermann) considers it necessary to incise the gall-bladder and examine it for stones whether stones can be felt through its wall or not.

D. *Isolation of the common duct.* After loosening the adhesions to the gall-bladder the cystic duct is exposed, and the attempt should now be made to lay bare the anterior surface of the hepatico-duodenal ligament. I have ordinarily found in this locality one or more enlarged lymph-glands. The ligament should now be laid bare downward and to the left until the right border of the duodenum is reached. The free right border of the hepatico-duodenal ligament should now be isolated, and the foramen of Winslow found. The index-finger of the left hand should now be passed upward and to the left in the foramen, whereupon



the contents of the ligament, namely, the vena porta, the common duct, and the hepatic artery, may be palpated between the index-finger and thumb.

E. *Palpation of the stone* is made by searching the duct from behind the duodenum, at about its middle, upward and to the right as far as the hilus of the liver. A floating stone, if present, is felt at the duodenal end or elsewhere in the duct, and often slips away when the attempt is made to engage it between the finger and thumb. It is easy to find the stone again anywhere in the common duct, but when it slips up into the hepatic duct it disappears, and may require considerable manipulation to bring it down into the common duct again. Czerny in Case XX. (reported by Mermann) performed choledochotomy without finding a stone, but removed two stones from the gall-bladder by ideal cholecystotomy. In Case XLI. biliary colic existed for one week five months prior to the operation. The icterus gradually decreased. The patient was emaciated, had lost thirty-six pounds in weight, and was sleepless. On three occasions small gall-stones were found in the feces. The patient was pronouncedly icteric, and the feces acholic. A median incision was made, and the gall-bladder found to be atrophied. During the loosening of adhesions to the greatly dilated hepatic and common ducts a sudden flow of bile occurred, and, as Mermann states, "consequently a tear or an opening in the common duct." The operator felt through the walls a stone, which was easily displaced, and slipped or floated up under the liver. No stone could be found after exploration with the sharp spoon and the forceps, but only old, blackish-green coagula were brought out. (This, I think, was the crushed stone, as in my Case VI. I encountered a small, third stone, which I could feel with the tip of my finger in the wound, but could not dislodge into the wound by manipulation of the hepatico-duodenal ligament.) The operator searched for the choledochus-stone for an hour, but could not find it. The ductus choledochus was sutured and tamponed; on the second day the drain was removed. The operation lasted two hours; the patient was out of bed in three weeks, and in nine months after the operation had gained forty pounds in weight. Mermann remarks: "Where did the stone that disappeared under the palpating finger, and could not be found, although searched for for an hour, go to? It is not clear; it was not found in the feces. It has probably not remained, as the patient recovered, and was well nine months after the operation. The stone was the size of a pea, and could hardly have passed into the gall-bladder, as the calibre of the cystic duct was not sufficient to permit this." My own idea is that the stone was either crushed during palpation between the thumb and finger, or by the sharp spoon, and that the blackish-green coagula were simply the débris of the crushed stone.



The field of operation should now be surrounded by three, four, or five large flat sponges.

F. *Fixation of the stone* at the place of intended incision is made by grasping the stone between the finger and thumb, and holding or pushing it up against the anterior surface of the duct. When the stone is floating, and we are consequently able to select the point of incision into the duct, it should be moved to the anterior surface of the left or lower half of the duct close to the duodenum. When the stone is yellow we can sometimes see it shining through the thin wall of the duct. In order to ascertain whether a stone or a tumor of the duct is present, a needle should be passed in, which will grate upon the stone.

G. *The incision in the duct* should be  $1\frac{1}{2}$  to 3 centimetres long, and in the direction of the axis of the duct, over the surface of the stone, which should present in the opening and should then be lifted out. The removal of the stone is ordinarily followed by a flow of bile, from which cultures should always be made. The place of incision in case of floating stone can be chosen, and should be, as I have already pointed out in the anatomy, in the duodenal portion of the duct, to avoid wounding the vena porta.

H. *Exploration of the duct* through the wound in it may be made with the finger; in the majority of cases the duct is sufficiently dilated to admit the little finger. It is my custom to explore in both directions: down behind the duodenum and up into the hepatic duct. By this means a small stone not felt upon external palpation of the hepatico-duodenal ligament may be discovered and extracted.

I. *Extraction of stones.* Stones of the common duct can usually be pushed up into the opening by manipulation and will then slide out, or they may be removed by forceps, or lifted out by sliding a sharp spoon behind them, or may be crushed and the débris removed by the sharp spoon. I have had made for this purpose a sharp spoon with a long, flexible handle, which may be bent in any position for the removal of the stone from the duct.

J. *Sounding* the common and hepatic ducts for stone should be accomplished with a metal probe, which upon touching the stone imparts a grating sensation. For this purpose I employ a silver uterine probe. A stone may also be dislodged by this means from the hepatic duct, as in my Case IV.

K. *Probing* to ascertain if the opening or passage down into the duodenum is free cannot always be accomplished, not because of an obstructing stone or stricture, but because the sound may meet a fold of mucosa in the dilated common duct. As bile passes after the removal of the stone, as we know from the remittance of the obstruction symptoms, any further attempt at opening the passage into the duodenum by means of the probe is unnecessary.

L. *Closure* of the wound in the common duct should be accomplished by a double row of sutures: an inner row through the muscular and external coats of the wall of the duct, but not penetrating the mucosa; and an outer row, including or taking in the peritoneum of the anterior wall of the hepatico-duodenal ligament. I usually leave the sutures long, in order to hold up the wound in the duct during the insertion of the following sutures. The insertion of sutures is easy when the wall of the duct is thickened, but difficult when the wall is thin, as the needle penetrates the mucosa and bile flows through the needle-punctures. The outer row of sutures may stop the flow of bile, but it is sometimes impossible to seal the wound hermetically, however carefully the sutures may be applied. In two of my cases no bile exuded from the wound, but in others, which terminated as favorably, there was a discharge of bile for a limited time—a much shorter time than obtained in the majority of my cases of ordinary cholecystotomy.

M. *Drainage* is accomplished by a rubber drainage-tube passed down to the wound in the duct, and gauze drains inserted one above and the other below the rubber drainage-tube. When the gall-bladder is opened, and instead of being closed is united to the abdominal wall, I drain the gall-bladder by a rubber drain only, and unite the abdominal wall below so as to separate the drains in the gall-bladder and common duct.

CONCLUSIONS. 1. In the great majority of cases of stone in the common duct the duct is dilated, and the stone floats in it.

2. Choledochotomy is the operation of choice, and should be employed whenever applicable, as it is far superior to all other methods of operation.

3. Choledochotomy is applicable in the vast majority of cases of stone in the common duct; the cases demanding other operative procedures are rare.

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## "THE CROSSED KNEE-JERK."

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THE interesting communication on this subject by Drs. Guy Hinsdale and Madison Taylor<sup>1</sup> has been the means of redirecting my attention to the knee-jerk as a subject for further experimental investigation. The phenomenon is of great interest to me, and was the subject of a former paper<sup>2</sup> in which certain experimental results which I had obtained were recorded.

All who have paid any attention to the subject, either experimentally or clinically, must be at one in admitting that such a phenomenon as that known as the "crossed knee-jerk" does occur; but the explanation which has been offered by Drs. Hinsdale and Taylor for its occurrence, though exceedingly ingenious, does not appear to me to meet all the requirements of the case, and the bulk of experimental evidence bearing on the question is opposed to such an explanation.

I do not propose to discuss the question as to whether the knee-jerk is or is not a true reflex; all that I propose to do is to examine the hypothesis advanced by Drs. Hinsdale and Taylor in explanation of the occurrence of the "crossed knee-jerk," to consider the question of reinforcement of the knee-jerk, a point which plays an important part in their paper, and to discuss the mechanism concerned when the knee-jerk returns after a long period of absence. The explanation which they offer with regard to the "crossed knee-jerk" is that "the first effect of the tap on the patellar tendon is a centripetal impulse producing activity of a portion of one cortical motor area, this in turn stimulating the corresponding portion of the other hemisphere and producing thereby a contraction of the adductors of the thigh opposite to the one originally struck." That this explanation is inadequate is, I think, proved by certain experiments which I have performed in order to test the point. The experiments were carried out in the Pathological Laboratory of University College, London, and I take this opportunity of thanking Professor Victor Horsley for his kindness in enabling me to work under such favorable circumstances. Dogs and rabbits were the animals used, but, as the results were practically the same in the two classes of animals, I propose to limit my account to the phenomena as observed in dogs.

**DIVISION OF THE CORPUS CALLOSUM.** If the "crossed knee-jerk" depends on an impulse passing from the "motor" cortex of one cerebral

<sup>1</sup> Internat. Med. Mag., June, 1895.<sup>2</sup> Proc. Roy. Soc., 1893.

hemisphere to the other, the most likely path along which such an impulse will travel is the corpus callosum. I, therefore, decided to divide this structure in order to see whether such a procedure would result in abolition of the "crossed knee-jerk." Ether was the anæsthetic used in each instance, and when the animal was under its influence tracheotomy was performed, a glass tube inserted into the proximal end of the trachea, and connected with a funnel by means of an India-rubber tube. The animal was subsequently kept under the influence of the anæsthetic by placing cotton-wool, saturated with ether, under the funnel that was in communication with the trachea-tube, and the animal was killed by an overdose of the anæsthetic at the termination of the experiment. The skull was trephined on one side of the middle line, and the trephine-opening further enlarged by bone-forceps so as to expose a large portion of the cerebral hemisphere on that side, and, extending across the middle line, the upper part of the opposite hemisphere was also exposed. The dura mater was next incised on both sides and raised toward the middle line, so as to expose the underlying hemispheres; these were in their turn carefully separated from each other along the middle line until the corpus callosum was fully exposed, and this structure was then divided along its whole length from before backward. This could sometimes be done without ligating the longitudinal sinus, but in other instances the sinus had to be ligated anteriorly and posteriorly and the intermediate portion removed.

After the corpus callosum was divided the anæsthetic was so regulated that the knee-jerks could be obtained, for, as we are all aware, in deep ether-narcosis the knee-jerks are abolished. I then clamped the India-rubber tube connected with the tube in the trachea and thus induced asphyxia, and with the increased activity of the knee-jerks, which resulted from this procedure,<sup>1</sup> it became possible to elicit, beyond all question, the so-called "crossed knee-jerk:" a blow on one patellar tendon resulting not only in contraction of the extensors of the knee on the same side, but also of the adductors of the thigh on the opposite side.

Such a result appears to me strong evidence against the view that the "crossed knee-jerk" depends on an impulse which has to pass from one cerebral hemisphere to the other, in that the phenomenon could still be elicited after the division of the path along which the impulse would be most likely to travel.

**TRANSVERSE SECTION OF THE SPINAL CORD.** I next determined to test whether the cerebrum took any part whatever in the production of the crossed knee-jerk. The animal was placed under the influence of ether and kept under the influence of this anæsthetic during the whole

<sup>1</sup> Cf. Risien Russell: Proc. Roy. Soc., 1893.



of the subsequent operation. Tracheotomy was not performed. The hair over that part of the back of the animal corresponding to about the mid-dorsal region of the spinal cord was shaved, the skin thoroughly washed, and then well scrubbed with a 1 : 1000 perchloride of mercury lotion. A longitudinal incision was made over the mid-dorsal spines and, all soft parts being cut and scraped away, the spines and laminæ of two vertebræ were removed by means of bone-forceps, the theca opened, and the spinal cord completely divided transversely with a sharp knife.

Warm boiled normal salt-solution was alone employed for washing and sponging out the wound from the moment that the dura mater was incised. The edges of the skin-wound were brought together by means of aseptic horse-hair sutures, and the wound dressed antiseptically.

Such a procedure is followed by well-marked exaggeration of the knee-jerks in the course of a week, and it then becomes possible not only to evoke a crossed jerk, but a greatly exaggerated cross-jerk, so that a tap on one patellar tendon not only evokes clonus in the extensors on that side, but also a powerful contraction of the adductors of the opposite thigh, and even of the extensors of that knee.

Another effect observed, sometimes, which is of interest, was that while a blow on the patellar tendon resulted in the phenomena just described, a similar blow, of the same force, delivered on the distal end of the femur or proximal end of the tibia, resulted in both the crossed phenomena; *i. e.*, the opposite adductors of the thigh and extensors of the knee contracted actively, while there was no response in the extensors of the knee on the side to which the blow was delivered. Further, it was sometimes possible, by repeated blows to the femur on one side, to evoke tonic extension of the opposite limb by contraction of the extensors of the knee, and this without any effect on the knee-jerk on the side whose femur was the recipient of the blows. At other times the same procedure resulted in contraction of the extensors of the knee on the side to which the blow was delivered, as well as of those on the opposite side; but, as a rule, even when this was the case the effect on the opposite side was greater than on the side whose femur received the blow.

The fact that the crossed knee-jerk can be elicited at all, after complete transverse section of the spinal cord above the lumbar enlargement, is proof that any explanation of its occurrence which supposes the necessity of an arc in which the brain is included does not fully meet the requirements of the case, for, with the spinal cord divided transversely in the mid-dorsal region, all chance of influencing the cerebral "motor" centres by the tap on the patellar tendon is out of the question, for no intact path remains by which the afferent or efferent impulse could travel to the brain, or from it to the muscle-group whose contraction results in the phenomenon known as the knee-jerk.

The fact that it is sometimes possible to evoke the crossed knee-jerk

by a blow delivered to the femur, without influencing the knee-jerk on the side to which the blow is delivered, is one difficult of explanation. Had this effect been unilateral<sup>1</sup>—i. e., only obtained, for instance, on the right side when the left side was struck, and not on the left side when the right was struck—then a reasonable explanation might have been offered; but inasmuch as with both limbs in as nearly as possible the same position the effect was obtained irrespectively of which side was the one to which the blow was delivered, a satisfactory explanation is by no means obvious. I prefer to record the fact which I have observed, without offering any explanation of it, for such explanations as suggest themselves to me have too few facts to support them, and therefore they can serve no useful purpose. The phenomenon is of interest when considered in conjunction with Marie's<sup>2</sup> case of syringomyelia, quoted by Drs. Hinsdale and Taylor, in which the left knee-jerk was absent and the right exaggerated, and in which a blow on the left patellar tendon resulted in contraction of the adductors of the opposite thigh, but there was no contraction of the extensors of the knee on the side whose patellar tendon was struck. The effect being a unilateral one in this case admits of a reasonable explanation; but why with all the centres of the lumbar cord intact it should be possible to obtain the effect from either side, as was the case in my experiments, is by no means obvious. The phenomenon is not new to me, however, as I have observed it, clinically, in hemiplegias and paraplegias.

The strongest evidence adduced by Drs. Hinsdale and Taylor in support of their hypothesis with regard to the crossed knee-jerk appears to me to be the fact that they were unable to obtain the phenomenon in cases of cerebral atrophies, idiots, and hemiplegias. These observers state that all cases with the slightest suspicion of exaggerated motor conditions were examined, by which I take it that they mean that the ordinary knee-jerk was increased in all these cases. Without the existence of such increased activity of the ordinary knee-jerk the fact that the crossed knee-jerk was not obtained would not be particularly remarkable; but that it should not be obtained in cases where the ordinary knee-jerk is exaggerated is both remarkable and strong evidence in support of the hypothesis they have advanced.

**REINFORCEMENT.** Drs. Hinsdale and Taylor are of opinion that "since the knee-jerk is reinforced by voluntary movement in any part of the body, that this reinforcement is due to an irradiation of motor impulse from the active centres to other similar centres, so that they and their related muscles acquire a heightened responsiveness to the external stimuli." Now the strongest objection to this view of rein-

<sup>1</sup> Cf. Provost and Waller: *Rev. Méd. de la Suisse Romande*, 1881.

<sup>2</sup> *L'Union Médicale*, April 17, 1894.

forcement appears to me to be in the fact that any voluntary motor impulse directed to the muscles on whose contraction the knee-jerk depends diminishes the possibility of eliciting the phenomenon, and this, no matter how slight that voluntary motor impulse may be. Then, again, we are all familiar with the fact that in using the Jendrassik method, if a patient is told to interlock the bent fingers of each hand and pull on them, and if he does so very forcibly, he is apt to bring other muscles into play in addition to those actually concerned in the act, and among these the extensors of the knee whose patellar tendon is under observation, a state of things which, instead of increasing the knee-jerk, makes it impossible to evoke the phenomenon.

In common with many neurologists, I believe that the spinal centres are normally under a certain amount of restraint or inhibition exerted on them by cerebral centres, and that so-called reinforcement consists in a lessening of the inhibition, which may be brought about by diverting the patient's attention to some other act. Indeed, I am inclined to go further, and to suppose that the energy expended by cortical centres in restraining the spinal ones is, for the time being, diverted toward the accomplishment of the particular act in question, and that thus the spinal centres are, so to speak, let go. It is clear, I think, that on such an assumption the term reinforcement is a misnomer as applied to the phenomenon in question; more energy is not added to the centres on which the knee-jerk depends, all that happens is that the full amount of energy which exists in these spinal centres is allowed to show itself.

I have satisfied myself that a purely mental process is in itself sufficient to "reinforce" the knee-jerk. If a patient in whom it is difficult, or apparently impossible, to obtain the knee-jerk be asked to make some such calculation as that of adding certain figures together or dividing or multiplying them, and if the patellar tendon be struck when this mental process is going on, the knee-jerk is at once easily obtained and may be quite active. I purposely do not allow the patient to perform even the motor act of writing the result of the calculation as it is being obtained, but tell him to try to remember the figures of the result as he further proceeds with the calculation; this has a still greater "reinforcing" effect on the knee-jerk than when the patient is allowed to write the result; and it is, further, free from the complication of bringing into play the voluntary motor act of writing the figures, which might be claimed as the real cause of the reinforcement.

This view of the nature of so-called reinforcement has more than hypothesis to support it, for that the cerebral centres must exert some controlling or inhibiting influence over the spinal centres is strongly suggested by a consideration of the following facts: Removal of one cerebral hemisphere in an animal—*e. g.*, a dog—results in increased activity of the opposite knee-jerk. So, too, complete transverse section of



the spinal cord at a level high enough not to interfere directly with the lumbar centres results in exaggeration of the knee-jerk in animals.

I am aware that, according to the observations of Bastian<sup>1</sup> chiefly, a complete transverse lesion of the spinal cord in man, above the lumbar enlargement, results in flaccidity of the muscles of the lower extremities and in abolition of the knee-jerks. This is so totally different to what obtains as a result of experimental section of the spinal cord in animals that, without careful microscopic examination of the lumbar cord, in series, together with a microscopic examination of the nerves and muscles on whose integrity the knee-jerks depend, it would be unwise to form too positive an opinion based on the observance of the phenomenon alone.

RETURN OF THE KNEE-JERK AFTER A PERIOD OF ABSENCE. Inasmuch as Kramer's cases<sup>2</sup> of progressive paralysis, complicated by sclerosis of the posterior columns, have been brought forward by Drs. Hinsdale and Taylor in support of their views, it is necessary for me to show how an interpretation in harmony with the views I have expressed may be put on these cases. The point about the cases was that the knee-jerks after being absent returned spontaneously or in association with apoplectiform or epileptiform attacks, to disappear again, or to remain to the time of the patient's death. Now the explanation that I would offer for the spontaneous return of the knee-jerk is that as a result of the progressive cerebral degeneration the inhibition exercised by the cerebral on the spinal centres is gradually removed, so that there comes a time when the spinal centres are so far freed from the restraining influence of the cerebral centres that the few remaining fibres in the posterior columns are sufficient to conduct a stimulus of sufficient intensity to elicit their response, whereas the same stimulus travelling along the same paths was unable to do so formerly because the inhibition exerted by the cerebral on the spinal centres was too great to allow them to respond to it. As regards the temporary return of the knee-jerk on one or other side in association with apoplectiform or epileptiform attacks in such patients, the explanation is practically the same, the only difference being that the progressive cerebral degeneration is not far enough advanced to abolish the inhibitory influence of the cerebral over the spinal centres, but the debilitating effect of an apoplectiform or epileptiform attack is sufficient to reduce the inhibitory influence of the cerebral centres temporarily, and hence the return of the knee-jerk. We are all familiar with the evidence of the debilitating effect which such attacks have on the cerebral centres, as evidenced by the transient attacks of hemiparesis which may be associated with them, and that, without sclerosis of the posterior columns, it is not uncommon to find the knee-jerk on the affected side more active than its fellow.

<sup>1</sup> Med.-Chir. Trans., vol. lxxiii. 1890. Lancet, March, 1890.

<sup>2</sup> Wiener medizinische Presse, 1894, No. 11, p. 424.



In further support of my view of the explanation of the phenomenon observed in Kramer's cases I would cite a case of *tabes dorsalis* published by Drs. Hughlings-Jackson and James Taylor,<sup>1</sup> and which I had many opportunities of investigating. The case was one in which the knee-jerks were absent as a result of *tabes dorsalis*, and after an attack of ordinary hemiplegia they both returned, that on the hemiplegic side being always the more active of the two. This case illustrates the intimate relationship which exists between the condition of the pyramidal tracts and the spinal centres concerned with the knee-jerk, and is in keeping with what we habitually see in cases of hemiplegia uncomplicated by sclerosis of the posterior columns, in which both knee-jerks become exaggerated as descending degeneration of the pyramidal tracts becomes established, the increase appearing earlier, and being more marked on the hemiplegic side. This state of things is strictly in accord with the anatomical distribution of the pyramidal tracts as established by the latest experimental researches. It was formerly supposed that fibres from each pyramid were distributed to the crossed pyramidal tracts of the opposite side of the spinal cord, and to the direct pyramidal tract of the same side. The researches of Sherrington led him to suppose that some pyramidal fibres which pass to the crossed pyramidal tract of the opposite side recrossed in the spinal cord so as to reach the crossed pyramidal tract of the same side as the pyramid from which they were originally derived. But more recent researches by Mellus<sup>2</sup> and Sherrington<sup>3</sup> himself have shown that the view with regard to recrossing of the pyramidal fibres in the spinal cord is erroneous, and that what really occurs is as follows: Each pyramid at the decussation in the medulla sends the bulk of its fibres to the crossed pyramidal tract of the opposite side of the spinal cord, a certain proportion to the crossed pyramidal tract of the same side of the cord, and others to the direct pyramidal tract on the same side of the cord. That this is the true distribution of the nerve-fibres derived from one pyramid I have had an excellent opportunity of verifying.<sup>4</sup> A cat, whose central nervous system I examined, had only one pyramid, the other being entirely absent, and from this single pyramid it was the simplest thing possible to trace the nerve-fibres to both crossed pyramidal tracts of the spinal cord. At the decussation in the medulla the bulk of the fibres could be seen passing to the opposite crossed pyramidal tract, while a considerable proportion passed to the crossed pyramidal tract of the same side of the cord. Facts like these make it evident why a lesion of one cerebral hemisphere should be responsible for alteration of both knee-jerks, and not only of that on the hemiplegic side.

The response obtained from the lumbar centres of the spinal cord, in

<sup>1</sup> Brit. Med. Journ., July 11, 1891.

<sup>2</sup> Lancet, 1894.

<sup>3</sup> Proc. Roy. Soc., 1894.

<sup>4</sup> Brain, 1895, Part I.

hemiplegia of some duration, as evidenced by the knee-jerk, is as a rule in excess of that met with in the normal condition, but whether this increased response is a measure of the amount of activity which the spinal centres are normally capable of, but which is kept in check by the inhibitory action of the cerebrum, or whether the effect indicates a heightened condition of activity of the spinal centres, induced in some way by the sclerosis of the pyramidal tracts, in excess of what these centres would be capable of if their full normal activity were allowed to show itself after all inhibitory control had been removed from them, is still open to question. The more one considers the subject the more one is forced to the belief that while the taking off of cerebral control is responsible for a good deal of the increased activity that may be seen in the knee-jerk, it is not directly responsible for the great increase of the jerk which is met with after descending degeneration of the pyramidal tracts has been well established. If the mere cutting off of cerebral inhibition were responsible for all the increased activity of the knee-jerk, then the full amount of this activity should be met with soon after the initial lesion; that is, as soon as any depressing influence which shock may have had on the spinal centres and any primary irritative inhibition have passed off. There is one consideration which must not be lost sight of in this connection, however, and that is, that while the process of degeneration is in progress the products of degeneration may keep up a constant inhibitory effect on the cells of the spinal cord, less than that formerly exercised by the cerebral cells, but sufficient to prevent the full effect of the removal of this cerebral influence to show itself. If this be so, then it is easy to see that the full effect can only become evident when all the primary products of degeneration have been removed and sclerosis takes the place of the degenerated fibres. Unless this be the explanation, we are driven to suppose that the full effect of the removal of the cerebral inhibitory influence is apparent as soon as all shock and primary irritative inhibition have passed off, and that any subsequent increase of the knee-jerk, after this period, is due to a heightened activity of the spinal centres, which is induced by, and develops with, the sclerosis of the pyramidal tracts.

THE INFLUENCE OF ALCOHOL AND ALCOHOLIC DRINKS  
UPON THE CHEMICAL PROCESSES OF DIGESTION.

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(Continued from p. 193.)

LAGER BEER (WITH 1.5 PER CENT. OF ALCOHOL AND 7 PER CENT.  
OF SOLID MATTER).

*Experiment 107.*

Period of digestion 8 hours.

| Beer.       | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|-------------|-----------------------|----------------------|---------------------------------|
| 0 per cent. | 0.5388 gram.          | 46.2 per cent.       | 100.0                           |
| 1 "         | 0.5596 "              | 44.1 "               | 95.4                            |
| 3 "         | 0.5769 "              | 42.4 "               | 91.7                            |
| 5 "         | 0.5817 "              | 41.9 "               | 90.7                            |
| 10 "        | 0.6147 "              | 38.6 "               | 83.5                            |

*Experiment 108.*

Period of digestion  $7\frac{1}{2}$  hours.

| Fluid<br>added.    | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|--------------------|-----------------------|----------------------|---------------------------------|
| 0 per cent.        | 0.3203 gram.          | 68.0 per cent.       | 100.0                           |
| 10 " beer          | 0.3602 "              | 64.0 "               | 94.1                            |
| 10 " " distillate  | 0.3487 "              | 65.2 "               | 95.8                            |
| 10 " " residue     | 0.3480 "              | 65.2 "               | 95.8                            |
| 1 " absol. alcohol | 0.3439 "              | 65.7 "               | 96.6                            |

PORTER (WITH 3.7 PER CENT. OF ALCOHOL AND 4.4 PER CENT. OF  
SOLID MATTER).

*Experiment 109.*

Period of digestion  $7\frac{3}{4}$  hours.

| Porter.           | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|-------------------|-----------------------|----------------------|---------------------------------|
| 0 per cent.       | 0.5102 gram.          | 49.0 per cent.       | 100.0                           |
| 1 "               | 0.5095 "              | 49.1 "               | 100.2                           |
| 3 "               | 0.5104 "              | 49.0 "               | 100.0                           |
| 5 "               | 0.5267 "              | 47.4 "               | 96.7                            |
| 10 "              | 0.5834 "              | 41.7 "               | 85.1                            |
| Absolute alcohol. |                       |                      |                                 |
| 1 per cent.       | 0.5318 "              | 46.9 "               | 95.7                            |

*Experiment 110.*Period of digestion  $5\frac{7}{12}$  hours.

|             | Fluid added.     | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------|------------------|--------------------|-------------------|------------------------------|
| 0 per cent. |                  | 0.3919 gram.       | 60.9 per cent.    | 100.0                        |
| 1           | " porter         | 0.4059 "           | 59.5 "            | 97.7                         |
| 10          | " "              | 0.4719 "           | 52.9 "            | 86.8                         |
| 10          | " " distillate   | 0.4071 "           | 59.3 "            | 97.3                         |
| 10          | " " residue      | 0.4163 "           | 58.4 "            | 95.8                         |
| 1           | " absol. alcohol | 0.4015 "           | 59.9 "            | 98.3                         |

BASS'S ALE (WITH 4 PER CENT. OF ALCOHOL AND 4.4 PER CENT. OF SOLID MATTER).

*Experiment 111.*Period of digestion  $7\frac{7}{12}$  hours.

|             | Ale. | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------|------|--------------------|-------------------|------------------------------|
| 0 per cent. |      | 0.4671 gram.       | 53.3 per cent.    | 100.0                        |
| 1           | "    | 0.4624 "           | 53.8 "            | 100.9                        |
| 3           | "    | 0.4949 "           | 50.6 "            | 94.9                         |
| 5           | "    | 0.5160 "           | 48.4 "            | 90.8                         |
| 10          | "    | 0.5311 "           | 46.9 "            | 87.9                         |

*Experiment 112.*Period of digestion  $7\frac{1}{12}$  hours.

|             | Fluid added.     | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------|------------------|--------------------|-------------------|------------------------------|
| 0 per cent. |                  | 0.3203 gram.       | 68.0 per cent.    | 100.0                        |
| 10          | " ale            | 0.3772 "           | 62.3 "            | 91.6                         |
| 10          | " " distillate   | 0.3386 "           | 66.2 "            | 97.3                         |
| 10          | " " residue      | 0.3684 "           | 63.2 "            | 92.9                         |
| 1           | " absol. alcohol | 0.3439 "           | 65.7 "            | 96.6                         |

The following experiment shows the comparative action of these malt liquors when tested under exactly the same conditions:

*Experiment 113.*

Period of digestion 5 hours.

|             | Fluid added.     | Undigested fibrin. | Proteid digested. | Relative proteolytic action. |
|-------------|------------------|--------------------|-------------------|------------------------------|
| 0 per cent. |                  | 0.3919 gram.       | 60.9 per cent.    | 100.0                        |
| 10          | " beer           | 0.4466 "           | 55.4 "            | 90.9                         |
| 10          | " ale            | 0.4686 "           | 53.2 "            | 87.3                         |
| 10          | " porter         | 0.4719 "           | 52.9 "            | 86.8                         |
| 1           | " absol. alcohol | 0.4015 "           | 59.9 "            | 98.3                         |

From these results it is manifest that the malt liquors, as represented by the above samples, have far less retarding action on trypsin-proteolysis than do wines. This fact, however, is not connected with the smaller



content of alcohol, but rather with the amount and character of the extract or solid matter of the fluid. Thus, lager beer, with only 1.5 per cent. of alcohol, when present in small amount, has a greater retarding action than either porter or ale, although these fluids contain 3-4 per cent. of alcohol. The beer, however, contains nearly twice as much solid matter as the other fluids, and its greater inhibitory power is presumably due to this cause. Small amounts of porter and ale have no noticeable retarding action whatever, but the presence of 5 or 10 per cent. of either of these malt liquors leads to a decided diminution of digestive power.

None of these malt liquors was very strongly acid; thus, the acidity of the ale was only slightly above that of the sample of rum, while the lager beer was considerably less acid. The porter alone was strongly acid, its acidity being nearly half that of the sherry wine. Plainly, the acidity of these malt fluids is not a very important factor in their retarding action on trypsin-proteolysis.

Doubtless, many non-alcoholic beverages have an equally pronounced inhibitory action on the digestive processes, owing to the presence of inorganic salts and other extractives. Tea and coffee, owing to the tannin they contain, are known to exert such an influence, and we may cite the following experiment with ginger ale as an illustration of inhibitory action caused presumably by the extractive matters contained therein:

*Experiment 114.*

Period of digestion 7 hours.

| Ginger<br>ale.    | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|-------------------|-----------------------|----------------------|---------------------------------|
| 0 per cent.       | 0.3260 gram.          | 67.4 per cent.       | 100.0                           |
| 1 "               | 0.3553 "              | 64.5 "               | 95.7                            |
| 3 "               | 0.3574 "              | 64.3 "               | 95.4                            |
| 5 "               | 0.3562 "              | 64.4 "               | 95.5                            |
| 10 "              | 0.3866 "              | 61.4 "               | 91.0                            |
| Absolute alcohol. |                       |                      |                                 |
| 1 per cent.       | 0.3361 "              | 66.4 "               | 98.5                            |

In contrast to this experiment, we report the following results obtained with bottled "soda water"; *i. e.*, water simply charged with carbonic-acid gas, which may be offered as evidence that it is possible to have pancreatic digestion without retardation.

*Experiment 115.*

Period of digestion 6½ hours.

| Soda<br>water. | Undigested<br>fibrin. | Proteid<br>digested. | Relative proteolytic<br>action. |
|----------------|-----------------------|----------------------|---------------------------------|
| 0 per cent.    | 0.4692 gram.          | 53.1 per cent.       | 100.0                           |
| 1 "            | 0.4695 "              | 53.1 "               | 100.0                           |
| 3 "            | 0.4675 "              | 53.3 "               | 100.3                           |
| 5 "            | 0.4690 "              | 53.1 "               | 100.0                           |

## COMPARATIVE ACTION OF SOME ALCOHOLIC LIQUORS ON TRYPSIN-PROTEOLYSIS.

The comparative action of some of these alcoholic liquors may be seen from the following results which are taken from preceding experiments, where all of the conditions were strictly comparable :

| Per cent. of alcoholic fluid<br>in digestive mixture. | Relative proteolytic action. |             |                |
|-------------------------------------------------------|------------------------------|-------------|----------------|
|                                                       | Rum.                         | Brandy.     | Proof-spirits. |
| 0 per cent.                                           | 100.0                        | 100.0       | 100.0          |
| 10    "                                               | 88.0                         | 89.8        | 90.5           |
|                                                       | Whiskey.                     | Sherry.     |                |
| 0 per cent.                                           | 100.0                        | 100.0       |                |
| 10    "                                               | 89.1                         | 82.4        |                |
|                                                       | Claret.                      | Hochheimer. |                |
| 0 per cent.                                           | 100.0                        | 100.0       |                |
| 10    "                                               | 65.0                         | 74.0        |                |
|                                                       | Beer.                        | Ale.        |                |
| 0 per cent.                                           | 100.0                        | 100.0       |                |
| 10    "                                               | 94.1                         | 91.6        |                |

In concluding this chapter of our subject, we may repeat that distilled alcoholic liquors, such as whiskey, brandy, etc., have a far greater retarding action upon trypsin-proteolysis than upon pepsin-proteolysis. Further, this retardation is not due wholly to the contained alcohol, but is attributable in part to the solid matter present. This latter, however, in a distilled liquor should obviously be very small, and it is quite apparent that if due care is used in the distillation and rectification of such a liquor and no additions are made, the only solid matter should be such as is extracted from the cask in which the liquor is stored. The liquors in question, however, did contain some extractive matter other than tannin, and to this material, as well as to the tannin and the alcohol, the retardation of trypsin-proteolysis is unquestionably due. Wines, with their high acidity and low alcoholic strength, exert a retarding action on tryptic digestion more nearly proportional to the acidity than to the amount of alcohol, or even to their content of solid matter. All three of these elements, however, undoubtedly combine to produce the results recorded. The malt liquors, on the other hand, owe their retarding influence mainly to the large percentage of extractives of various sorts which they contain, the alcohol playing a minor part in the inhibition caused by the fluids of this class.

## SALIVARY DIGESTION.

In considering the influence of alcoholic beverages on salivary digestion, it is to be remembered that the latter process has for its main object the digestion of the farinaceous foods. This property is shared

in common with the pancreatic juice, the utilization of all farinaceous foods by the body being dependent almost wholly upon the so-called amylolytic power of these two secretions.

Salivary digestion is a comparatively rapid process, the transformation of the insoluble starch into soluble dextrans and sugar taking place in a relatively short period, as contrasted with the proteolytic action of either the gastric or pancreatic juice. Amylaceous or farinaceous foods are exposed to the action of the saliva in the mouth for only a short interval, but the evidence at present available points to the probable continuation of salivary digestion in the stomach for from ten to thirty minutes before the amylolytic ferment is killed by the increasing acidity of the gastric juice. In view of this relatively short period of digestion, retardation of amylolytic action may become a serious matter, since even slight retardation may mean the loss of more or less nutriment to the body. The amylolytic ferment of the pancreatic juice, however, may be able to convert the unchanged starch in the small intestine, providing the influence of the retarding agent does not extend so far. But in any event, retardation or stoppage of salivary digestion must be a serious evil, and it is to be remembered that the amylolytic ferment of the pancreatic juice is closely akin to, if not identical with, the ferment of the saliva, and hence is susceptible to the same influences that affect the salivary ferment.

#### METHODS EMPLOYED.

In testing the influence of alcoholic liquors on the salivary digestion of starchy foods the following method was most generally employed: Ten c.c. of a freshly prepared starch-paste (1 per cent.) were introduced into a suitable flask, a given volume of the alcoholic fluid together with sufficient water to make the resultant mixture up to 90 c.c. added; and, lastly, 10 c.c. of neutralized and filtered saliva, which had been previously diluted to some definite volume. The completed mixture was thus composed of 100 c.c. The time at which the saliva was added was carefully noted, and the mixture placed in a suitable water-bath kept at 38°-40° C. In order to measure the rate of digestion a drop of fluid was withdrawn at intervals, placed on a white porcelain surface, and tested with a drop of a dilute iodine-solution. The color obtained with iodine under these conditions is dependent upon the extent of amylolytic action. Thus, the presence of soluble starch, the first product formed, is indicated by a blue color. As digestion proceeds the blue color gives place to a reddish color with iodine, owing to the presence of erythrodextrin, while the final products of amylolytic action, maltose and achroödextrins, give no color whatever with iodine. The time when this so-called "achromic" point is reached is carefully noted, and the

number of minutes required for the appearance of the "achromic" point serves as a measure of the rate of amylolytic action.

A method less frequently used in our experiments, but better adapted to measuring accurately small shades of difference, was as follows: One gram of arrowroot-starch was made into a paste with 40 c.c. of water, 50 c.c. of water alone (in the control) or with the required volume of alcoholic fluid to give the desired percentage were then added; and, lastly, 10 c.c. of a diluted neutral saliva. The mixture, or series of mixtures, was then placed in a bath at 38°–40° C. for thirty minutes, after which the solution was heated to boiling to prevent further action of the enzyme. The resultant solution was then made up to 150 c.c., and the extent of amylolytic action ascertained by determining in one-sixth of the solution the amount of maltose formed by the use of Allihn's<sup>1</sup> gravimetric method. From the amount of reduced copper thus obtained, the amount of maltose was calculated on the basis of Salomon's<sup>2</sup> statement that 100 parts of anhydrous maltose will form 114 parts of reduced copper when boiled with Fehling's solution after the Allihn method.

It is, of course, understood that in both methods all of the mixtures belonging to a given series were treated with the same specimen of saliva.

#### ABSOLUTE ALCOHOL (99.5 TO 100 PER CENT.).

##### *Experiment 116.* (Saliva 1:15.)<sup>3</sup>

| Alcohol.    | Appearance of the achromic point. |   |   |   |            |
|-------------|-----------------------------------|---|---|---|------------|
| 0 per cent. | .                                 | . | . | . | 7 minutes. |
| 0.5 "       | .                                 | . | . | . | 7 "        |
| 1.0 "       | .                                 | . | . | . | 7 "        |
| 2.0 "       | .                                 | . | . | . | 7 "        |
| 5.0 "       | .                                 | . | . | . | 7 "        |
| 10.0 "      | .                                 | . | . | . | 7 "        |

##### *Experiment 117.* (Saliva 1:20.)

| Alcohol.    | Appearance of the achromic point. |   |   |   |            |
|-------------|-----------------------------------|---|---|---|------------|
| 0 per cent. | .                                 | . | . | . | 7 minutes. |
| 1 "         | .                                 | . | . | . | 7 "        |
| 10 "        | .                                 | . | . | . | 7 "        |

<sup>1</sup> Zeitsch. f. Analyt. Chemie, Band xxii, p. 448.

<sup>2</sup> Journal für Praktische Chemie, Band xxviii, p. 109.

<sup>3</sup> Being the dilution of the saliva added to the digesting mixture; *i. e.*, 1 part of fresh saliva in 15 parts of water. It is to be remembered, however, that in the digestive mixtures (100 c.c.) the dilution of the saliva is increased tenfold.



*Experiment 118.* (Saliva 1:30.)

| Alcohol.            | Appearance of the achromic point. |
|---------------------|-----------------------------------|
| 0 per cent. . . . . | 27 minutes.                       |
| 0.5 " . . . . .     | 27 "                              |
| 1.0 " . . . . .     | 27 "                              |
| 2.0 " . . . . .     | 27 "                              |
| 5.0 " . . . . .     | 27 "                              |
| 10.0 " . . . . .    | 25 "                              |

From these results it is plainly manifest that absolute alcohol has very little influence upon the amylolytic or starch-digesting power of neutral saliva. Only when the saliva, added to the digestive mixture, is diluted in the proportion of 1 to 30 does the presence of even 10 per cent. of alcohol have any measurable influence, and then only to retard the appearance of the achromic point two minutes. As this percentage of absolute alcohol is equal to at least 20 per cent. of proof-spirit, it follows that pure alcohol free from admixture is practically without influence upon the digestion of farinaceous foods by the saliva.

A more accurate testing of this question was attempted by the use of the second method above described, with the following results :

*Experiment 119.* (Saliva 1:4.)

| Alcohol.    | Reduced copper<br>in $\frac{1}{4}$ . | Maltose<br>formed.           | Relative amylolytic<br>action. |
|-------------|--------------------------------------|------------------------------|--------------------------------|
| 0 per cent. | 0.0885 gram.                         | 31.05 per cent. <sup>1</sup> | 100.0                          |
| 0.5 "       | 0.0918 "                             | 32.21 "                      | 103.7                          |
| 1.0 "       | 0.0908 "                             | 31.86 "                      | 102.6                          |
| 3.0 "       | 0.0911 "                             | 31.96 "                      | 102.9                          |
| 5.0 "       | 0.0897 "                             | 31.47 "                      | 101.3                          |
| 10.0 "      | 0.0862 "                             | 30.25 "                      | 97.4                           |

*Experiment 120.* (Saliva 1:5.)

| Alcohol.    | Reduced copper<br>in $\frac{1}{5}$ . | Maltose<br>formed. | Relative amylolytic<br>action. |
|-------------|--------------------------------------|--------------------|--------------------------------|
| 0 per cent. | 0.1436 gram.                         | 75.5 per cent.     | 100.0                          |
| 5 "         | 0.1439 "                             | 75.7 "             | 100.2                          |
| 0 "         | 0.1367 "                             | 71.9 "             | 95.2                           |
| "           | 0.1309 "                             | 68.0 "             | 90.0                           |

*Experiment 121.* (Saliva 1:4.)

| Alcohol.    | Reduced copper<br>in $\frac{1}{4}$ . | Maltose<br>formed. | Relative amylolytic<br>action. |
|-------------|--------------------------------------|--------------------|--------------------------------|
| 0 per cent. | 0.122 gram.                          | 64.2 per cent.     | 100.0                          |
| 5 "         | 0.120 "                              | 63.1 "             | 98.2                           |
| 10 "        | 0.119 "                              | 62.5 "             | 97.3                           |
| 15 "        | 0.114 "                              | 60.0 "             | 93.4                           |

<sup>1</sup> Calculated on the 1 gram of starch employed.

*Experiment 122.* (Saliva 1:2.)

| Alcohol.    | Reduced copper<br>in $\frac{1}{6}$ . | Maltose<br>formed. | Relative amyolytic<br>action. |
|-------------|--------------------------------------|--------------------|-------------------------------|
| 0 per cent. | 0.132 gram.                          | 69.4 per cent.     | 100 0                         |
| 5     "     | 0.131     "                          | 68.9     "         | 99.2                          |
| 10    "     | 0.126     "                          | 66.3     "         | 95.5                          |
| 15    "     | 0.125     "                          | 65 7     "         | 94.6                          |

At first glance, these results would seem to be somewhat opposed to those obtained in the first series of experiments, but such is not the case. The first method simply tells us the time when all the starch has been transformed into achroödextrin and maltose. The second method, however, tells us more than this, viz., the actual amount of *maltose* that has been formed, and as a certain amount of achroödextrin can be transformed into maltose by the continued action of the salivary ferment it follows that this latter method gives us a clearer knowledge of the influence of alcohol upon the secondary action of the amyolytic enzyme. Thus, we find that small amounts of absolute alcohol may actually cause an increased formation of maltose. On the other hand, the presence of 10 or 15 per cent. of absolute alcohol leads to a distinct retardation in the formation of sugar, although the inhibition is not very pronounced considering the amount of alcohol present. This retardation of the secondary action of the ferment is perhaps suggested by the slight delay in the appearance of the achromic point in Experiment 118, in the presence of 10 per cent. of absolute alcohol.

## WHISKEY (WITH 50 PER CENT. OF ALCOHOL).

*Experiment 123.* (Saliva 1:30.)

| Whiskey.    | Appearance of the achromic point.                   |
|-------------|-----------------------------------------------------|
| 0 per cent. | . . . 28 minutes.                                   |
| 0.5     "   | . . . 22 hours.                                     |
| 1.0     "   | . . . no action beyond erythrodextrin. <sup>1</sup> |
| 2.0     "   | . . . no action whatever. <sup>2</sup>              |
| 5.0     "   | . . . "        "                                    |

*Experiment 124.* (Saliva 1:25.)

| Whiskey.          | Appearance of the achromic point.      |
|-------------------|----------------------------------------|
| 0 per cent.       | . . . 6 minutes.                       |
| 0.5     "         | . . . 8     "                          |
| 1.0     "         | . . . 17 hours.                        |
| 2.0     "         | . . . no action beyond soluble starch. |
| 5.0     "         | . . . no action at all.                |
| Absolute alcohol. |                                        |
| 2.5 per cent.     | . . . 6 minutes.                       |

<sup>1</sup> The final observation was always made at the end of twenty-four hours.<sup>2</sup> Ibid.

*Experiment 125.* (Saliva 1:20.)

| Whiskey.              | Appearance of the achromic point. |
|-----------------------|-----------------------------------|
| 0 per cent. . . . .   | 7 minutes.                        |
| 0.5 " . . . . .       | 8 "                               |
| 1.0 " . . . . .       | 9 "                               |
| 2.0 " . . . . .       | no action beyond erythrodestrin.  |
| 5.0 " . . . . .       | no action whatever.               |
| Absolute alcohol.     |                                   |
| 2.5 per cent. . . . . | 7 minutes.                        |

*Experiment 126.* (Saliva 1:15.)

| Whiskey.              | Appearance of the achromic point. |
|-----------------------|-----------------------------------|
| 0 per cent. . . . .   | 5 minutes.                        |
| 0.5 " . . . . .       | 5 "                               |
| 1.0 " . . . . .       | 7 "                               |
| 2.0 " . . . . .       | 24 hours.                         |
| 5.0 " . . . . .       | no action whatever.               |
| Absolute alcohol.     |                                   |
| 2.5 per cent. . . . . | 5 minutes.                        |

*Experiment 127.* (Saliva 1:7.)

| Whiskey.            | Appearance of the achromic point. |
|---------------------|-----------------------------------|
| 0 per cent. . . . . | 3 minutes.                        |
| 2 " . . . . .       | 5 "                               |
| 5 " . . . . .       | no action beyond erythrodestrin.  |
| 10 " . . . . .      | no action whatever.               |
| Absolute alcohol.   |                                   |
| 5 per cent. . . . . | 3 minutes.                        |

*Experiment 128.* (Saliva 1:3.)

| Whiskey.            | Appearance of the achromic point. |
|---------------------|-----------------------------------|
| 0 per cent. . . . . | 3 minutes.                        |
| 5 " . . . . .       | 4 "                               |
| 10 " . . . . .      | 24 hours.                         |
| Absolute alcohol.   |                                   |
| 5 per cent. . . . . | 3 minutes.                        |

*Experiment 129.* (Saliva 1:4.)

| Whiskey.    | Reduced copper<br>in $\frac{1}{6}$ . | Maltose<br>formed. | Relative amylolytic<br>action. |
|-------------|--------------------------------------|--------------------|--------------------------------|
| 0 per cent. | 0.109 gram.                          | 57.3 per cent.     | 100.0                          |
| 5 "         | 0.110 <sup>1</sup> "                 | 57.8 "             | 100.8                          |
| 10 "        | 0.080 "                              | 42.0 "             | 73.3                           |
| 15 "        | 0.010 "                              | 5.2 "              | 9.0                            |

From these results it is apparent that whiskey may have a very great retarding action upon salivary digestion, the retardation being the more

<sup>1</sup> Allowance being made for the reduction obtained from a corresponding amount of the whiskey alone.

pronounced the greater the dilution of the saliva. When, however, the saliva is diluted only three or four times, so that the proportion of saliva in the digestive mixture is as 1:30 or 1:40, then the presence of even 5 per cent. of whiskey is wholly without action. It is furthermore apparent that the alcohol of the whiskey plays no part in this inhibitory action. What now is the cause of the retardation? In this connection it is to be remembered that all the whiskeys examined by us have shown an acid reaction; furthermore, the saliva used in our experiments was neutralized saliva. Taking into consideration the well-known sensitiveness of the salivary ferment toward acids, the question naturally presents itself whether this retardation of amylolytic action caused by the whiskey is not due to the acidity of the fluid. This question we attempted to answer by the following experiments:

*Experiment 130. (Saliva 1:15.)*

| Fluid added. |                    | Appearance of the achromic point. |
|--------------|--------------------|-----------------------------------|
| 0 per cent.  |                    | 4 minutes.                        |
| 2.0          | " whiskey          | 24 hours.                         |
| 2.0          | " " neutralized    | 7 minutes.                        |
| 1.0          | " absolute alcohol | 4 "                               |

*Experiment 131. (Saliva 1:25.)*

| Fluid added. |                    | Appearance of the achromic point. |
|--------------|--------------------|-----------------------------------|
| 0 per cent.  |                    | 9 minutes.                        |
| 1            | " whiskey          | 24 hours.                         |
| 1            | " " neutralized    | 22 minutes.                       |
| 5            | " " "              | no action.                        |
| 5            | " " neutralized    | partial action.                   |
| 10           | " " "              | " "                               |
| 2.5          | " absolute alcohol | 11 minutes.                       |

From these results it is apparent that the retarding action of the whiskey is in great part overcome by neutralization of the liquor, providing the saliva is not too greatly diluted. It is furthermore apparent that with unneutralized saliva—*i. e.*, with the normally alkaline secretion—the retarding action of at least small quantities of whiskey would be far less than is indicated by the above results. Indeed, it may be safely said that with a fair volume of unneutralized, and not too greatly diluted saliva, the presence of even 5 per cent. of whiskey would be practically without action on the salivary digestion of farinaceous foods, a conclusion which Roberts has likewise reached. Obviously, however, the degree of acidity of a given sample of whiskey, together with the natural alkalinity of the saliva, would be important factors in determining the precise character of the result.

In this connection the question may properly be asked why we employed neutralized saliva in our experiments, instead of the normally



alkaline fluid? To this we would answer that in no other way was it possible to obtain constant and comparable conditions, since the alkalinity of the secretion is ever variable, and, moreover, every variation in the dilution of the fluid would obviously cause a corresponding variation in the degree of alkalinity. Further, the best action of saliva is normally obtained when the fluid is neutral, and the natural tendency of the food-stuffs is toward neutralization of the secretion, both in the mouth and in the stomach. Again, since the fluids we were testing all have an acid reaction, it seemed more probable that we should obtain a trustworthy indication of the action of these fluids upon the amylolytic ferment by using a neutral solution of the enzyme.

In conclusion, then, we may repeat that the retardation of amylolytic action caused by large amounts of whiskey is not closely connected with the amount of alcohol the liquor contains, but is more intimately associated with the presence of volatile, acid-reacting bodies; possibly also ethereal bodies, volatile oils, and perhaps also tannin. Hence, the greater the purity of the whiskey, the less will be its retarding action upon the digestion of the farinaceous food-stuffs.

That the solid, non-volatile portions of the whiskey that we experimented with have no retarding action upon the amylolytic power of the saliva is shown by the following experiment made with the residue left on evaporation of the whiskey; an experiment which also shows that the acid-reacting bodies present in the whiskey are volatilized by heat:

*Experiment 132. (Saliva 1:4.)*

| Whiskey<br>residue. <sup>1</sup> | Reduced copper<br>in $\frac{1}{\%}$ . | Maltose<br>formed. | Relative amylolytic<br>action. |
|----------------------------------|---------------------------------------|--------------------|--------------------------------|
| 0 per cent.                      | 0.091 gram. <sup>2</sup>              | 47.8 per cent.     | 100.0                          |
| 5 "                              | 0.115 "                               | 60.4 "             | 126.3                          |
| 10 "                             | 0.113 "                               | 59.4 "             | 124.2                          |
| 15 "                             | 0.103 "                               | 54.1 "             | 113.1                          |

So far as these results go, they indicate that the solid matter present in this sample of whiskey when free from alcohol and the volatile acid-reacting bodies has a marked stimulating action upon salivary digestion. Whether this result may be expected from all whiskeys is, of course, uncertain.

<sup>1</sup> The residue dissolved in water. The percentages refer to the residue obtained from those percentages of whiskey.

<sup>2</sup> Deduction being made for the reducing power of the residue itself.

(To be concluded.)

## REVIEWS.

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### THE DEFORMITIES OF THE HUMAN FOOT, WITH THEIR TREATMENT.

By W. J. WALSHAM, M.B., C.M. Aberd., F.R.C.S. Eng., Senior Assistant Surgeon, Surgeon in Charge of the Orthopædic Department and Lecturer in Anatomy, St. Bartholomew's Hospital; Surgeon, Metropolitan Hospital; Consulting Surgeon, Hospital for Hip Diseases, Sevenoaks, and Bromley Cottage Hospital; Examiner in Anatomy to the Conjoint Board of the Royal College of Physicians of London and Royal College of Surgeons of England; Corresponding Member of the American Orthopædic Association; Late Examiner in Surgery to the Apothecaries' Society of London; and WILLIAM KENT HUGHES, M.B. Lond., M.B. Melb., M.R.C.S. Eng., L.R.C.P. Lond., Orthopædic Surgeon, St. Vincent's Hospital; Assistant Surgeon, Children's Hospital, Melbourne; Surgical Tutor, Trinity College, Melbourne; Sometime Clinical Assistant in the Orthopædic Department, St. Bartholomew's Hospital; Formerly House Surgeon, Central London Ophthalmic Hospital; and Ophthalmic Assistant, Middlesex Hospital. New York: William Wood & Co., 1895.

As stated in the preface, this work is essentially a record of the present and past experience in the Orthopædic Department of the St. Bartholomew's Hospital. It discusses the causes, pathology, symptoms, and treatment of all the deformities of the human foot, and is written from the standpoint of the general surgeon rather than of the specialist. A very concise description of the normal foot, its anatomy, functions, and changes of form produced by the natural positions and movements, forms the text for the opening chapter. The authors object to considering the bony form of the foot an arch, preferring to call it "an elastic living mechanism," yet fail to show it other than an arched structure controlled by elastic living tissues, and throughout the entire work reference is made to "the arch of the foot."

All forms of club-feet are divided into two classes according to their cause, viz., congenital and acquired, and the authors recognize but five simple or primary varieties, valgus and planus being considered the same. A brief review of the various theories of congenital club-foot is given under Chapter III., the authors regarding the mechanical theory as the most tenable. Under this same chapter are described the degrees of deformities, four divisions being made according to the position of the foot. This is manifestly incorrect, as many seemingly severe cases are very easily corrected, and *vice versa*. A sure method of judging the severity of a case is to ascertain the resistance to correction by the hand offered by the deformed foot. The article on the "Causes of Relapsed and Uncured Cases" is very interesting, the two principal ones being an imperfect cure and neglect of after-treatment.

Chapter IV. includes the pathology, diagnosis, prognosis, and treatment of congenital equino-varus, or, as they prefer to call it, varus. The description of this condition is in many respects detailed, and is taken mostly from one specimen (No. 3510) in the St. Bartholomew's Hospital Museum, and nearly all the illustrations (which are quite numerous) are taken from it. Special attention is directed to the downward inclination of the head of the astragalus in producing equino-varus, and this factor is regarded as one of the greatest obstacles to correction of these malformations. As influencing the prognosis, more stress is laid upon the rigidity of the structures than upon the position of the foot, which, as above stated, would seem the better method of classifying the degree of severity as well as the best guide to the prognosis. The treatment is considered in detail under (1) manipulative, (2) mechanical, (3) operative methods. Great stress is laid upon the use of plaster of Paris as a means of holding the foot in the corrected posture, and the precautions necessary to its proper use are well presented. Under the operative treatment no mention is made of the Anderson method of tendon-elongation, one so admirably adapted to many of these cases and especially to adults with greatly contracted tendo-Achillis. It has been practised extensively in America—in fact, almost to the exclusion of all other methods.

Congenital and Acquired Equinus are described in Chapter VI., and, as the latter form is the one most frequently met with, it is discussed at length. The mildest type of this deformity is a right-angled contraction of the tendo-Achillis, preventing the foot from being dorsi-flexed beyond a right angle to the leg, while in the severer forms the patient walks upon the toes or the distal extremities of the metatarsal bones. Many interesting photographs illustrate the complications which are sometimes seen in this deformity. In paralytic equinus, beside the use of massage and electricity, the application of braces with rubber strips or steel springs to assist or supplant the defective muscles is recommended.

In Chapter VIII., the authors take up equino-varus and equino-valgus, classing them as varieties of equinus and applying the term equino-varus to cases in which the deformity is acquired, while the congenital variety is called varus. This plan renders the subject very confusing, and is inferior to the generally accepted nomenclature, and the book would undoubtedly have gained in clearness had the more common classification been used. The treatment is discussed under the same heads as the other varieties, and presents nothing new.

Calcaneus is divided into three degrees according to the extent to which the foot can be plantar-flexed, and the mechanical theory is again upheld as the most satisfactory explanation of the cause of this condition. Under "Shortening of Tendons" in the operative treatment, Wilson's method, which is an adaptation of Anderson's method of lengthening to shortening, is not mentioned. This form of operation possesses superior advantages over the ones described, in that it gives a definite amount of shortening and leaves the tendon of a uniform thickness, the redundant ends being removed.

Chapter IX. is devoted to the consideration of valgus, which the authors make synonymous with flat-foot or planus, as they "hold that there cannot be flattening of the arch without more or less abduction of the foot," yet there are undoubted cases in which the arch of the foot gives way and flattening occurs, throwing outward the metatarsals and

phalanges, but in which true abduction of the foot does not exist, and the tarsals entering into the formation of the ankle-joint retain the same relation to the tibia and fibula as before relaxation took place, which would not obtain if abduction were present. A specimen in the Mütter Museum, College of Physicians, Philadelphia, admirably illustrates this point. On the other hand, one frequently sees cases of valgus or abduction of the foot without flattening of the foot-sole. This article on flat-foot is, however, an excellent one, and is well illustrated by photographs of cases and specimens. The short reference to the use of the hot-air bath in the treatment of severe grades of flat-foot is of decided value, as this method is comparatively new, and will doubtless prove a valuable addition to orthopædic therapeutics.

In the article on *Hallux Valgus* the deformity is described as "an outward dislocation or displacement of the great toe at the tarso-metatarsal joint," but should read "at the metatarso-phalangeal joint." This is probably a typographical error, as another such occurs in the article on deformities of the small toes, where the word "metacarpal" is used for "metatarsal." There are but few typographical errors in the book, the print is very distinct, and the numerous illustrations render the subject-matter more clear, though many of them are of rather inferior quality, the outlines and many important points in specimens being poorly shown.

The majority of the references are from authors who wrote twenty or thirty years ago, and many of the latest advances in the treatment of these conditions are not mentioned. Much of the apparatus described is too complicated and unsuited to the use of the general surgeon.

The book does not represent the true position of this branch of orthopædic surgery in this country, but as a department-record it may prove valuable, though it is very voluminous.

J. T. R.

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HANDBOOK OF THE DIAGNOSIS AND TREATMENT OF SKIN DISEASES. By ARTHUR VAN HARLINGEN, Ph.B. (Yale), M.D., Emeritus Professor of Dermatology in the Philadelphia Polyclinic; Dermatologist to the Howard Hospital. Third edition, pp. 577, enlarged and revised, with sixty illustrations, several of which are in colors. Philadelphia: P. Blakiston, Son & Co., 1895,

THE third edition of this manual is presented to the professional public in an improved and considerably enlarged form. It is slowly, in fact, assuming the dimensions of the larger treatises devoted to the same subject.

Dr. Van Harlingen's *Handbook* has long been esteemed by the class of readers to whom it specially appeals, for the ease with which in it reference may be made to any given subject, for the conciseness and lucidity of the text, and in particular for the exceedingly practical and useful methods of therapeutics for which the previous editions won for it a deserved reputation. Whatever faults it may have are those chargeable chiefly to an alphabetical arrangement of its material and the frequent necessity of compressing the paragraphs devoted to the consideration of an important subject within the compass of a few pages, when a much more elaborate presentation is required in order to give the student



a just conception of the field. If these be faults, they are shared in full measure by the otherwise acceptable encyclopædic treatise by Brocq, which the author of the present manual takes especial occasion to eulogize. In Mr. Malcolm Morris's small handbook of nearly the same size and of similar scope the diseases of the skin are arranged in an order which, if not accordant with the latest advances of pathology, is at least one which does not do such violence to facts as to set land-scurvy next to sebaceous cyst and sarcoma in nearest juxtaposition to scabies!

The truth is, an alphabetical arrangement of diseases is proper only for the encyclopædia, for the dictionary, and for the tables of the statistician. To accept such an arrangement for a scientific work is a confession of weakness. It is less easy for the tyro to search for the chapter on a given disease in an index than to find the name on the top of a right-hand page; but he pays a price for this ease in the resulting and inevitable jumbling of ideas on the subjects which he purposes studying. It is true that the most of manual writers declare that they "refer the reader to the larger treatises for fuller information," but the student in the class-room usually satisfies himself with what is at hand without searching further or more minutely.

One of the conspicuous features of the weakness of an alphabetical arrangement of subjects as distinguished from a scientific system from what is or even an approach to such, is betrayed in the disproportion of the space devoted to different chapters, the sense of such disproportion apparently escaping even the mind of the author. Thus in the small volume before us there are about twenty pages devoted to hypertrichosis, with seven plates representing freaks of nature with respect to hairiness, while ringworm of the beard occupies less than two pages; and lichen planus and ruber together, three. Again, no fewer than nine pages are devoted to "feigned diseases of the skin," while erythrasma (with which the author does not seem to be familiar) is given one-half page; impetigo and impetigo contagiosa together, four; and acquired syphilis of the skin, but seven.

The work as a whole fairly represents the later knowledge had on the subjects discussed. A few errors strike the eye, as, for example, where the disease known in France as *la perlèche* is named in two places "*perliche*;" and where monilethrix is distorted to "*monothrelix*." Some of the quotations from the French, as, for example, the foot-note on page 365, are incorrectly reproduced.

Lupus erythematosus is here set down as a form of tuberculosis of the skin, the author thus allying himself with certain English and French writers, though the demonstration of tubercle-bacilli in the disks of erythematous lupus has not yet been satisfactorily accomplished. In the chapter on Cutaneous Tuberculosis, however, the author refers his readers to the varieties of lupus vulgaris as they are described under a separate head, because "they have so long been known by their present name."

It is in the matter of practical usefulness that this small volume excels the other works of its class. Its specific details relative to the treatment of diseases of the skin and its compilation of formulas, some original, others obtained from the best sources, are always satisfactory and in many respects superior to the older works on cutaneous disease, especially those of foreign authorship.

The typography of the work and the illustrations represent a distinct improvement upon the former editions.

J. N. H.

OUTLINES OF MATERIA MEDICA AND PHARMACOLOGY. By H. M. BRACKEN, M.D., Professor of Materia Medica, Therapeutics, and Clinical Medicine, University of Minnesota. Pp. v., 383. Philadelphia, P. Blakiston, Son & Co., 1895.

WE have read this book with considerable interest and some curiosity. When a book is presented upon a medical subject which is already treated of by a large number of authors we naturally inquire whether anything new is contained in it, or the old is to be met with in an improved form. And if it is to be used by students, it must be accurate. From these points of view we have read this work, and what have we found? At the outset we must disagree with the author that pharmacognosy has anything to do with the origin of drugs, and that pharmacology is synonymous with pharmacodynamics. Pharmacology is a broader term and covers both pharmacognosy and pharmacodynamics. After the introduction, which contains nothing unusual save that we are informed (p. 24) that the imperative of *recipio* is *recipi*—the second person singular of the imperative of the third conjugation ending in *i*!—we come to a discussion of the acids, or, rather, of some acids. Quite properly, acids like salicylic are presented under other headings, and oleic might just as well have been included in the list of "Other Acids." About the parts devoted to the metals, non-metallic elements, and the animal kingdom we have little to say; they are fairly well presented, and the average student can read them with profit. The carbon compounds are important, and the student should receive accurate information concerning them. The nomenclature should be that of the *Pharmacopœia*. Butyl-chloral Hydras, the official title, should be substituted for croton chloral (p. 182), a misnomer. The author uses the Greek letter  $\phi$  to indicate remedies which are not official—not a very happy choice, for the same symbol is used by clinicians to denote phthisis. The use of this letter is not always in accordance with the facts; e. g., hypnal and somnal (p. 183) are not official, while oleum theobromatis (p. 240) is pharmacopœial; other instances might be given. It is when we come to the part devoted to the vegetable kingdom that we find the largest field for criticism. First, arrangement: we admit that all systems of classification are more or less unsatisfactory. We are of the opinion that some system is better than none. The student finds (p. 236) cambogia following krameria; the former, if placed with other cathartics and the latter with other astringents, might be fixed in the student-mind as respectively cathartic and astringent. As the matter now stands, we fail to find any reason whatever for the arrangement of this part. An alphabetical order would have been justifiable—and good text-books are to be found arranged in this way—if the author cannot be satisfied with any of the various systems which are in use. But when an important section opens with *cimicifuga*, followed by *hydrastis*, *berberina*, *hydrastine*, *hydrastinæ hydrochloras*, *pulsatilla*, *anemonin*, *adonidine*, *staphisagria*, *aconitum*, and the rest of the drugs of vegetable origin, taken up without regard to source, uses, physiological or botanical relationship, we may be pardoned if we admire the mental capacity of the student who can reduce the chaos of this part to an orderly knowledge of the action and uses of drugs. The only sem-

blance of arrangement which we can find is, that on pp. 290 *et seq.* and 322 *et seq.* are collected a number of drugs which the author designates as unimportant. We note omissions, as the toxicology of cocaine (p. 242), and one repetition, hæmogallol (pp. 130 and 216). We find opinions contrary to those generally accepted: "lithium salts are practically useless in the treatment of the uric-acid diathesis" (p. 60); when there is a tendency to "heart-failure during the administration of chloroform" inversion of the body should not be practised (p. 169). The nomenclature could be improved by the omission of the final letter in such words as exalgine, stereoptene. There are variations in orthography: chekan and cheken (p. 271); errors of spelling: coccillana for cocillaña (p. 250), hæmotogen for hæmatogen (p. 116). We note indefinite statements: pilocarpine hydrochlorate "may be used in some forms of alopecia" (p. 245); quassia may be used "in some forms of dyspepsia" (p. 249). As examples of careless writing we may cite scoparius. "The action is more fully described under scoparius and sparteine, *q. v.*" (p. 255). "Strophanthus may be used alone or as an alternate with digitalis" (p. 302). "Kino may be used as an astringent, when astringents are required, in diseases of the alimentary canal" (p. 260). The book suggests the notes taken in long-hand of lectures rapidly delivered—it is sketchy. In some places important details are omitted and unimportant ones inserted. Examining the book from the standpoints with which we began this review, we are obliged to say that it does not offer much that is new, the form in which certain parts are presented is not logical, and it contains many inaccuracies. As an outline of Materia Medica and Pharmacology we believe that it deserves the title, but we are very decidedly of the opinion that an unsystematized text-book is not a proper one for students. As to the former, careful revision can readily make it acceptable; as to the latter, not only revision but rearrangement is necessary. The industry which has been displayed in this book leads us to believe that both form and matter will be greatly improved in another edition.

R. W. W.

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THE DISEASES OF CHILDREN'S TEETH; THEIR PREVENTION AND TREATMENT. By R. DENISON PEDLEY, M.R.C.S., Dental Surgeon to the Evelina Hospital for Sick Children, London. Octavo, pp. 268. J. P. Segg & Co., 1895.

THE author of this volume, a surgeon as well as a dentist, addresses it to medical practitioners and students, feeling, as he says, that in most instances the dental department is neglected in the training of medical men. He emphasizes the value of the teeth in the maintenance of good health, and he endeavors to teach the most important of these points in dental pathology and treatment in children which the medical practitioner should be cognizant of. After a chapter upon the Structure of the Teeth, he discusses their eruption, giving a better illustration of the appearances of the temporary and permanent sets than is commonly seen in most text-books upon children's diseases. His remarks here upon the power of teething in some cases to produce a train of unpleasant symptoms are very pertinent at the present time. The author himself has



no doubt of the connection of these symptoms with dentition. Important, too, are his remarks upon the necessity of being able to distinguish between the temporary molars and the bicuspid, and of keeping a watch over the first permanent molars, which are so often neglected and allowed to decay on the supposition that they belong to the temporary set.

Next come chapters on Caries, Pulpitis, and Periodontitis, and then an extensive one upon Irregularities of the Teeth. This last is abundantly illustrated and includes the treatment of overcrowding of the teeth. Very useful information is given here for those practitioners who are not in localities where dentists can be readily consulted. The chapter upon the Hygiene of the Mouth contains some startling statistics showing the frequency of carious teeth in children, and the relation of this condition to various disorders of health. The final chapter, upon Treatment, discusses the method of examining teeth, the treatment of toothache, and the filling of teeth. The necessary instruments and material are described; the requirements of the medical man rather than those of the dentist being constantly kept in mind.

In conclusion, we cannot better express the favorable impression the book has made upon us than to say that we began the reading of it with the feeling that it would be useless to us, and finished it feeling that we had gained a great deal of very serviceable information.

J. P. C. G.

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MEDICAL AND SURGICAL REPORT OF THE CHILDREN'S HOSPITAL (Boston), 1869-1894. Edited by T. M. ROTCH and HERBERT L. BULLARD, M.D.

IF this handsome volume of 367 pages were an example of hospital reports frequently published in the United States, we could still welcome it with interest and appreciation. Unfortunately, as matters stand, published hospital reports of any sort—apart, of course, from the ordinary yearly one issued by the managers of every institution—are the exception, not the rule. Many foreign hospitals issue printed volumes at frequent intervals, containing very valuable contributions to medical science; while in this country the great mass of hospital practice lies buried in more or less scattered and inaccessible written case-histories. Such a condition is little less than shameful; and we welcome with corresponding pleasure this first report of the Children's Hospital of Boston.

The book contains, as a first volume naturally would, a detailed account of the origin and growth of the hospital; a list of managers and officers from its incipency to the present time; an account of the system of training nurses followed there; a description of the method of work followed in the surgical wards and in the out-patient department, and other papers of a generally descriptive nature. Besides these there are articles by various members of the hospital staff upon different medical and surgical subjects, all based upon cases occurring in the institution. There are too many of these to do more than point out a few which have interested us especially. Among the medical articles there is a valuable tabular arrangement by Morrill of 42 cases of typhoid fever taken consecutively from the hospital records, with an analysis of the symptoms; a paper on Malaria in Children by Buckingham; one on the Etiology of Chorea, based on a study of 148 cases in the out-patient department,



by Townsend. The surgical division of the volume is particularly rich. The experience of the hospital in Pott's disease and in diseases of the joints, especially of the hip and knee, is described, with numerous reproductions of photographs to illustrate the treatment employed. The paper on Lateral Curvature is good. An excellent tabular arrangement gives the histories of the cases of empyema operated upon. These and a large number of other articles are signed only with the initials of the writers. Besides these we must refer to the Study of Traction in Hip-disease—a scientific paper by Bradford; and to Tenotomy in Spastic Paralysis, by Bullard.

We greatly hope that this, the first "Report," will be followed in coming years by others as valuable as it.

J. P. C. G.

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EPITOMES OF MODERN SURGICAL PROGRESS—URINARY SURGERY. By E HURRY FENWICK, F.R.C.S. Bristol: John Wright & Co., 1894.

ONLY a word is necessary in calling attention to this *résumé* of genito-urinary surgery. To keep abreast with the progress of modern surgery is beyond the power of any one man. This volume places before one in attractive form for ready reference the recent literature upon this most important department of surgical art. The surgery of the kidney, ureter, bladder, electric cystoscopy, disease of the prostate, seminal vesicles and urethra, with a complete bibliography of the ground covered, form the subjects for consideration. It would be valuable if such a volume could be published every few years, recording the rapid progress made.

C. L. S.

# PROGRESS OF MEDICAL SCIENCE.

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## THERAPEUTICS.

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UNDER THE CHARGE OF

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### THE RED-LIGHT TREATMENT OF SMALLPOX.

DR. NIELS R. FINSSEN believes that when the patients come under treatment early enough—before the fourth or fifth day of the disease—suppuration of the vesicles, even in unvaccinated persons, and in cases of confluent smallpox, will be avoided—one exception out of about seventy; as a rule, the secondary fever does not appear, but even when it does the temperature is lower and the fever of shorter duration than is usually the case. As a result of the absence of suppuration the disease becomes of shorter duration and less dangerous, as the greater number of complications do not show themselves; further, the patient escapes pitting. Some authors have observed “minute scars” on the nose and fingers in some few cases; but this only proves that what are generally known as “pock-marks” are done away with. It would seem that children—perhaps on account of their fine epidermis—are more completely exempted from scars than adults. It must, however, be mentioned that this treatment does not prevent the skin becoming hyperæmic where the vesicles have been; the hyperæmia disappears after six to eight weeks, and it is then impossible to see that the person in question has suffered from smallpox. Should the patient come under treatment after the fifth day of the disease, it is uncertain whether the suppuration can be avoided; sometimes this is the case, sometimes not; but it would appear that in such cases the treatment renders the suppuration less severe and less malign. The method is as follows: 1. The exclusion of the chemical rays must be absolute; even a brief exposure to daylight may produce a suppuration and its *sequelæ*. If red window-glass is employed, it must be of a deep red color; and if curtains are used, they must be very thick or in several layers, and thoroughly nailed so that the nurses cannot interfere with the treatment. During meals and physician's visits a faint candlelight may be used without danger. 2. This method does not prevent, but allows

the employment of any other treatment which may be considered necessary. 3. The treatment should be commenced as early as possible; the nearer the commencement of the suppuration the smaller the chance of success. 4. The patient must remain in the red light until the vesicles have dried up.—*The British Medical Journal*, 1895, No. 1823, p. 1413.

#### THE PRODUCTS OF THE THYROID GLAND.

DR. SIGMUND FRAENKEL names a substance—thyreo-antitoxin—which he believes to represent the active principle of the thyroid gland. He uses a cold-water extract of a weighed quantity of dried sheep's thyroid. The albumins are almost completely precipitated by acetic acid. It is now necessary to determine whether the precipitate, which consists of the albumins, nucleal-albumin, etc., or the filtrate contains the active principles. Experiments on dogs showed that the latter was active. Two control-observations gave the same result. From this filtrate a substance was isolated, very hygroscopic, soluble in water and alcohol, but insoluble in ether. Its aqueous solution is neutral or slightly alkaline. It can be represented by the empirical formula  $C_6H_{11}N_3O_5$ . The advantages of this substance over the various preparations in taste and odor, in convenience of administration, and in accuracy of dosage are readily understood.—*Wiener klinische Wochenschrift*, 1895, No. 48, S. 842.

DR. E. HERTOGHE has studied the influence of thyroid-products upon growth, noting that after their ingestion by children suffering from congenital or acquired myxœdema, the growth, even if checked for a long time, is now immediately recommenced with energy. At the outset he states that myxœdema in children is little known and imperfectly described; the symptoms may be slight—for instance, the swelling of the hands and feet may be wanting, the psychic symptoms have been notably exaggerated, and the increase of body-weight may be small. The descriptions of the books are based upon exaggerated cases, yet once a case of myxœdema has been seen there is nothing easier than to make a diagnosis. From nine observations he concludes that (1) all have been profoundly influenced by the ingestion of thyroid, having increased in height without regard to the age (6, 14, 18, 27 years) to which they had reached. (2) Their intelligence has expanded. (3) With all, the body-weight has commenced by diminishing, then increased *pari passu* with the gain in height and finally surpassed the initial weight. Taking up the effect of this substance on children who were not the subjects of myxœdema, but whose growth has been retarded, he reports six cases: two of chronic albuminuria, two of rhachitis, one of precocious establishment of menstruation, and finally one of extreme congenital debility. From these he would conclude that under the influence of thyroid they again commence to grow, and some of them very rapidly.—*Bulletin de l'Académie Royale de Médecine de Belgique*, 1895, No. 9, p. 878.

#### APOLYSIN.

DRS. LEON VON NENCKI and JOSEF VAN JAWORSKI have carried out a series of experiments upon animals, themselves and their colleagues, and finally upon a large number of clinical cases. Apolysin resembles phenacetin

in that both contain para-phenetidin, but in the former a citric-acid takes the place of an acetic-acid radical, which replaces the hydrogen-atom in the amide-group of the latter. It is a yellowish-white crystalline powder, having a sour taste and a faint odor, soluble in cold water, more so in hot, in alcohol, and in glycerin. So far as therapeutic effect is dependent upon chemical composition we should expect it to be harmless, and that in the body it would be decomposed into para-amidophenol and para-phenetidin, ethyl, and citric acid, the last being oxidized into carbon dioxide and water. The first two of this series probably depress the temperature, and the ethyl relieves pain. Clinically, the drug was tested in pneumonia, scarlet fever, pyæmia, follicular tonsillitis, erysipelas, hemicrania, sciatica, headaches, neuralgia, and lumbago, generally given alone as a powder, but sometimes combined with the bromides or with caffeine. The general conclusions are that it depresses a febrile temperature, diminishes the pain and hyperæsthesia of neuralgia, causes no unpleasant after-effects, but should not be given upon an empty stomach or in gastric hyperacidity. Since it is very soluble, it is quickly absorbed and its effects appear more rapidly, and because it is not poisonous, large and frequently repeated doses can be administered. The usual dose for adults is from eight to thirty grains *per diem*; three times the latter quantity can be safely administered.—*Allgemeine medicinische Central-Zeitung*, 1895, Nos. 60, S. 709; 61, S. 721; 62, S. 734.

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#### SOLANUM CAROLINENSE IN THE TREATMENT OF EPILEPSY.

DR. CHARLES S. POTTS has used this remedy in seventeen cases, obtaining the following results: Five, two of them organic, were not improved. In the remaining twelve, the results showed more or less benefit from the drug. Of the five failures, in four the symptoms were ameliorated by either antipyrin and ammonium bromide or the mixed bromides, and in the remaining case no drug seemed to have any influence. No unpleasant effects were observed, excepting a mild diarrhœa in some cases, which in many epileptics may be more of a benefit than otherwise. The conclusions are as follows: (1) That the drug has a decided influence for good upon the epileptic paroxysm. (2) That this influence is probably not so great nor so sure as that obtained by the use of antipyrin and the bromides, or even of the mixed bromides. (3) That in those cases in which it is of service it relieves the paroxysms without causing other unpleasant symptoms, such as are sometimes caused by the use of large doses of the bromides. (4) That the dose ordinarily recommended is too small, and that as much as a teaspoonful or more four times daily is often needed to secure results.—*Therapeutic Gazette*, 1895, No. 12, p. 798.

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#### THE TREATMENT OF BRAVAIS-JACKSONIAN EPILEPSY.

DR. P. DIGNAT sums up a study of the application of circular blisters over the course of the aura as follows: (1) Whether these are applied at the point of departure or immediately above, they constitute a more efficacious method of combating certain forms of partial epilepsy. (2) This treatment should be limited to cases of partial epilepsy not due to cranial traumatism, cerebral syphilis, or organic lesion of the nerve-centres. (3) Observations



having demonstrated that this medication succeeds when other methods, more commonly employed, have failed, it should have the preference. (4) Finally, this method, being absolutely harmless, should be tried before all the others, so that the patient will be protected against certain accidents which are always possible with other methods—for instance, the use of the bromides.—*Bulletin Général de Thérapeutique*, 1895, 44e liv., p. 456.

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#### THE TREATMENT OF PERIODIC HEADACHE BY ERGOT.

DOTT. LUIGI CAPPELLARI reports three cases treated with large doses of the fluid extract of this drug. These were chronic cases, and had proved to be rebellious to the ordinary remedies. To this elixir of quinine was added to overcome the nauseous taste. Nausea and vomiting were likely to occur if equal parts of each drug were given, so that it would be necessary to resort to enemata. This was obviated by making the proportion as follows: One drachm of the fluid extract of ergot with three drachms of elixir of quinine.—*La Riforma Medica*, 1895, No. 241, p. 191.

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#### THE TREATMENT OF TOXIC DYSPNŒA.

DR. H. HUCHARD contends that this dyspnœa is not uræmic, but it can be brought about by an animal diet, and, on the other hand, he has readily made it to disappear by placing the patient upon an exclusively milk-diet. Thus do we find the reason for terming this dyspnœa toxic as originating from ptomaines. Three different types can be distinguished: (1) Renal, characterized by a slight albuminuria and a cardiac *bruit de galop*, and high arterial tension. (2) Cardiac, by cardio-sclerosis, arrhythmia, aortic dilatation, and even mitral murmurs. (3) Aortic, by various aortic lesions (chronic aortitis, insufficiency, sometimes angina). The matters for consideration are: (1) For fifteen days an exclusively milk-diet (three to four quarts daily). (2) Then twice each month for five days, one-half to two quarts of milk daily, vegetables of all sorts, some eggs, fruits, grapes, meat in small quantity, once each day, at midday, during the days preceding the series of exclusively milk-diet. (3) Avoid at all times soups, fatty broths in excess, salt, and made-over dishes, fish, cheese, preserves, tea, liquors, wine, and tobacco. (4) An occasional purgative, 10 grains of calomel and resin of scammony, in two cachets. (5) On the second day of the exclusively milk-diet and for three or four days six cachets, each containing eight grains of theobromine, and this increased to a daily dose of sixty to seventy grains. (6) During the mixed *régime* twice daily a dessertspoonful of a 1 per cent. solution of sodium iodide. Of course, this dyspnœa should not be mistaken for that of acute pulmonary œdema, which is a frequent and formidable complication of cardiac lesions which are secondary to those of the arteries.—*Journal des Praticiens*, 1895, 2e Semestre, No. 22, p. 342.

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#### THE CUTANEOUS ACCIDENTS OF SERO-THERAPY.

DR. E. MARAGLIANO reports that following injections of serum, in the treatment of tuberculosis, various cutaneous manifestations have been observed: Transient erythema, outbreaks of urticaria and phlegmuous

infiltrations of subcutaneous connective tissue. Obviously, these could be caused by the injection of the serum *per se*, independent of the antitoxin which it contained or by the serum which contains antitoxin. So far as concerns the first, Héricourt pointed out that in the transfusion of the blood of animals to man there was noticed the readiness with which urticaria was produced. In this instance it was the subcutaneous injection of dog-serum in the treatment of tuberculosis, although the dog had not been vaccinated or inoculated in any way. Similar observations were made by Vidal. Legendre reported that horse-serum caused an erythematous eruption each time that it was injected into a man. Frequently, on the argument of *post hoc ergo propter hoc*, various manifestations have been attributed to the serum. Three hypotheses are possible, that these disturbances depend upon a special exciting action of the serum, or to a personal susceptibility of the individual, or to a combination of these two conditions. Héricourt noted that the serum from some dogs was of double the toxic power of others. Further, it has been shown that a serum which could be used upon a considerable number of individuals without injury may cause accidents when used upon a particular one. Probably the third hypothesis is the most probable, and the personal factor of most importance is the vulnerability of the tissues. In case of these manifestations it is well to suspend the injection, recommencing after four or five days. If the quantity employed was more than fifteen drops, it should be reduced to that amount and injected only once in two days. He concludes that the cutaneous disturbances consequent to injections of antituberculosis-serum are those common to injection, whether of normal or medicinal serum. They are not of importance only when, by their persistence, they make it necessary to suspend the treatment.—*Gazzetta degli Ospedali e delle Cliniche*, 1895, No. 147, p. 1537.

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#### THE PAQUIN ANTITUBERCLE-SERUM.

DR. L. L. SHROPSHIRE reports briefly five cases, and states that in the twenty-five treated all have improved, some very materially, and others not so much. In these cases he acknowledges the aid which the climate of Southwestern Texas has given him. On the other hand, the results achieved by the originators of the treatment, Lemon, Tuholsky, and Simpson, in a damp, cold, and unfavorable climate lead to a belief in the obtaining of greater success in a more suitable climate.—*New York Medical Journal*, 1896, No. 892, p. 15.

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#### THE SUBCUTANEOUS USE OF CREOSOTE AND GUAIACOL IN PULMONARY PHTHISIS.

DR. F. R. WALTERS briefly reviews the literature and gives his own results in six or eight cases. He uses solutions, in sterilized and purified oil, of creosote, 1 (French) and 2 (English), 1 in 15; of guaiacol 3 (French), 1 in 5. The injections were made from once to three times a week, and the usual daily dose was from 10 to 15 minims of the substances. The syringe was furnished with an asbestos-piston, and could be readily sterilized. The largest dose of creosote was 20 minims, and of guaiacol 33 minims. The local effects were slight burning at the site of injection, which usually soon

passed off unless the injection was made where the skin was tight. A swelling was left, which felt hard and indurated, the induration passing off, as a rule, in about a week, but sometimes lasting longer, but there was usually no pain nor inflammation afterward. There was no complaint of tasting the creosote directly after injection. In one case there was slight collapse after the first injection of 20 minims of the 1 to 15 creosote solution; the same patient subsequently readily stood drachm doses. In one case the appetite greatly improved, the lung-trouble nearly disappeared, the cough disappeared, and the weight was increased and the patient remained in good health. In another the lung-trouble had increased, but much more slowly than was to be expected, while the general health remains exceptionally good. The two others of the four, whose histories were carefully kept, have not been long enough under observation for definite opinions. The treatment seems to be well borne, and may be useful when other methods fail. The doses should be very cautiously increased, and the treatment should be long continued, but it should not be tried when the kidneys are unsound, nor when there is a large area of inflamed lung, nor decided signs of intolerance. 1 in 5 guaiacol seems to be as well borne as 1 in 15 creosote solution, nor does it seem to be inferior.—*British Medical Journal*, 1895, No. 1824, p. 1488.

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#### CREOSOTED MORRHUOL.

DR. JOSEPH LAFAGE considers beechwood-creosote to have an elective action upon the lung and directly combating the diseases and especially their causes; it should be termed a specific medicament. Morrhuel, on the other hand, is an excellent solvent of creosote. The combination then—the morrhuel—acts as a reconstituent and preventive of waste of the first rank, acting especially upon the respiratory passages, and—the creosote—a powerful disinfectant, antiseptic, and parasiticide, and acting not only upon the respiratory, but as well upon the digestive system. Six to eight grains of this mixture can be taken each day without inconvenience and with benefit to the patient. It has found its principal use in pulmonary tuberculosis, but it is equally valuable in chronic catarrhal bronchitis.—*La Médecine Moderne*, 1895, No. 98, p. 759.

[The author ignores the abominable taste and odor of the preparation, and that the burden of proof that morrhuel represents the valuable properties of cod-liver oil devolves upon those who advance the claim.—R. W. W.]

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#### THE LABORDE METHOD OF ARTIFICIAL RESPIRATION.

DR. EDWARD MARTIN, taking as a text the statement "that respiratory movements which had ceased from asphyxia or other cause, life not being extinct, could be restored by rhythmical traction exerted upon the tongue," presents a careful study of the subject, reporting seven instances of its use. Laboratory-experiments upon animals and clinical tests seem to show beyond controversy that when but one method of artificial respiration can be adopted, as in the case of a single helper in charge of an asphyxiated patient the Laborde method is pre-eminently the best. Indeed, any form of artificial respiration, unless the tongue is drawn well forward, is unsuccessful.



When more than one helper is at hand this method should be supplemented by the Sylvester movements; *i. e.*, traction during inspiratory movements of the arms, relaxation during expiratory movements. Because of its ease of application and its efficiency, the Laborde method should be taught as the first and most efficient means of resuscitating the apparently dead.—*Therapeutic Gazette*, 1895, No. 12, p. 793.

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#### THE TREATMENT OF GRIPPAL PNEUMONIA BY LARGE DOSES OF PILOCARPINE.

DR. POULET uses five-sixths of a grain of pilocarpine hydrochlorate—less for children—in all cases, even of old patients, several of whom were over seventy years. Generally two such doses in two days are sufficient, but occasionally the third dose may be necessary on the following day. Then the cure is completed by the use of ammonium acetate in solution. He reports but four deaths among one hundred and eight pneumonias.—*Les Nouveaux Remèdes*, 1895, No. 22, p. 507.

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#### STYPTICIN IN UTERINE HEMORRHAGE.

DR. SIGMUND GOTTSCHALK states that this substance, which is cotarnin hydrochloride, is obtained from narcotine, the well-known alkaloid of opium. Narcotine, when oxidized, as was shown by Wöhler, breaks up into opianic acid and cotarnin ( $C_{11}H_{12}NO_3(O.CH_3) = C_{12}H_{15}NO_4$ ), the latter bearing a close resemblance in chemical formula to hydrastinine ( $C_{11}H_{13}NO_3$ ). Cotarnin hydrochloride is an amorphous, sulphur-yellow powder, giving with water a straw-yellow color, which becomes darker on exposure to the light. Internally, this powder can be given in powder or capsules in five-sixths of a grain dose, five or six times daily. Hypodermatically three grains can be injected into the gluteal muscles if hemorrhage is profuse. Besides its hæmostatic properties it seems also to relieve pain, soothes the patient, and even to be conducive to sleep; these properties being very advantageous in dysmenorrhœic conditions. Fifty-seven cases of uterine hemorrhage from various causes are reported in which the use of this remedy yielded good results.—*Therapeutische Monatshefte*, 1895, Heft 12, S. 646.

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#### THE TREATMENT OF OSTEOMALACIA.

DR. GUILLAUME ROSSIER mentions as a remedy, phosphorus in doses from one sixty-fourth to one-sixteenth of a grain, but if this does not result in benefit then castration is to be considered. The brilliant results which have been obtained by the use of bone-marrow in certain blood-diseases suggest from the standpoint of the changes in the blood and in bones in this disease that here also benefit could be obtained.—*Therapeutische Monatshefte*, 1895, Heft 12, S. 653.

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#### A PREPARATION OF MILK FOR DIABETIC PATIENTS.

DR. SYDNEY RINGER adds to a pint and a half of milk about three ounces of a 10 per cent. solution of acetic acid. This precipitates a curd, caseinogen. It should be allowed to settle, and the clear fluid siphoned off and distilled



water added. After settling this should be filtered and well washed with distilled water. If it is then well rubbed up in a mortar with some calcium carbonate, and water is added and all the caseinogen becomes dissolved, the calcium carbonate soon settles, and the milky fluid can be decanted off. The dissolved caseinogen behaves just like milk. If rennet and a calcium salt is added and the mixture is heated to 104° F., it quickly clots, the caseinogen becomes changed into casein, which precipitates by combining with the calcium salts. Later experiments show that the caseinogen settles better after the addition of the acetic acid if the milk is diluted with an equal quantity of water, and, further, it is filtered and the precipitate is washed on a calico filter, which permits of more rapid manufacture than if a paper filter is used. This solution is milk without the milk-sugar. If 2 per cent. of glycerin is added, a not unpalatable form of milk is produced.—*British Medical Journal*, 1895, No. 1823, p. 1412.

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#### GUAIACOL-ANÆSTHESIA.

DR. LUCAS CHAMPIONNÈRE has obtained local anæsthesia by the subcutaneous injection of fifteen minims of a 5 or 10 per cent. solution of guaiacol in oil. The first experiments were made by Marin in dental surgery; the results were superior to those of cocaine. Anæsthesia is obtained in about ten minutes. The method has also been employed for the ablation of wens and for incision of phlegmons.—*Bulletin Général de Thérapeutique*, 1895, 46e liv., p. 518.

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#### ALBUMINURIA CONSECUTIVE TO CHLOROFORM-INHALATION.

DR. PATEIN has made seventy-six observations, each one comprising specimens taken before anæsthesia, during anæsthesia but before the operation, and after recovery from the anæsthetic. Albuminuria was found before anæsthesia in 12 per cent., during anæsthesia but before the operation in 35 per cent., and after the operation in 73 per cent. of these cases. This albuminuria disappears generally by the end of two or three days, is not proportional to the duration of the anæsthesia, and appears to depend solely upon the chloroform. With patients who are already albuminuric, the quantity of albumin may be increased, but this is not generally, nor is there any fixed rule. The kidneys do not undergo any serious alteration, the uric acid and chlorides are generally more abundant, but there appears to be nothing more than a passage of serum-albumin at the glomerulus.—*Journal des Praticiens*, 1895, 2e Semestre, No. 24, p. 378.

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#### THE ACTION OF BETA-NAPHTOL AND BISMUTH SUBNITRATE AS INTESTINAL ANTISEPTICS.

DRS. N. SURVEYOR and VAUGHAN HARLEY undertook to determine definitely the real value of the former drug. The chemical experiments consisted in estimating the amount and ratio of alkaline and aromatic sulphates present in urine of man before, during, and after taking either of the drugs separately or together. The amount of urea was also estimated at the same time to see how far the body was kept on nitrogen equilibrium. The method

of administration was always *per os* in the form of powders. In the first series of experiments with beta-naphtol, during one week the normal ratio of the sulphates was obtained, then the drug was administered in fifteen-grain doses at breakfast and dinner for twelve days. The day and night urine were collected separately. The second series lasted thirty-seven days. The first day's urine was tested for the normal ratio. On the succeeding seven days seven and one-half grains of bismuth subnitrate were taken twice daily, at breakfast and dinner. During the next week fifteen grains were taken thrice daily, at breakfast, lunch, and dinner. During the next four days fifteen grains of beta-naphtol in the morning and evening, with bismuth subnitrate, which was continued in fifteen-grain doses thrice daily. The general result of these experiments was to show an increase of aromatic sulphates during the time when the beta-naphtol was taken either alone or with bismuth subnitrate. The total sulphates did not vary much during the same period as compared with the normal periods. On the other hand, the alkaline sulphates were always diminished under the influence of beta-naphtol. The general health remained the same during these periods except that on the last day of bismuth subnitrate and beta-naphtol griping and slight looseness of the bowels occurred; beta-naphtol also appeared in the urine. It is not possible to say how far the latter drug serves to diminish the aromatic sulphates, because that is most probably masked by the drug itself, which is excreted as an aromatic sulphate at the expense of the alkaline sulphates. The bacteriological observations consisted of the ordinary test-tube experiments, and these show that both drugs have the power of preventing or hindering the growth of micro-organisms; that beta-naphtol is the stronger of the two, in some cases. The safest dose for the latter is about 8, for the former 10, in 10,000. To ascertain how far these drugs would act as intestinal antiseptics the determination of the approximate number of colonies present in the contents of the different parts of the alimentary canal of dogs, after feeding them for several days on the same kind of food, was undertaken. Dogs which were treated with both drugs showed considerable reduction of the colonies throughout the whole tract. Simple beta-naphtol showed a similar reduction. The bismuth subnitrate produced a reduction in the number in the upper, but hardly reduced it in the lower part of the tract. A further set of experiments were carried out by taking diluted contents of the large intestine of dogs and adding the drugs either singly or together, and leaving them in an incubator at body-heat. These showed that bismuth subnitrate is more powerful as a germicide than beta-naphtol, when large doses are used. However, internally beta-naphtol appears to act better than bismuth subnitrate. The reason for this discrepancy is that although the latter is the stronger antiseptic, its value is lowered on account of its constipating property.—*British Medical Journal*, 1895, No. 1824, p. 1483.

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#### THE DISADVANTAGES OF LACTOPHENIN.

DR. HERMANN STRAUSS reports three instances of catarrhal icterus, accompanied with stools which were free from bile, during the administration of this drug. Hitherto few unpleasant symptoms have been recorded. Naturally perspiration has been noticed, but severe disturbances on the

part of the heart have not been reported. Two cases of exanthemata from the remedy have already been observed by the author. The dose employed was 15 grains four times daily. The colorless stools persisted several days in two cases, but in the third for seven weeks. In every case the commencement of the jaundice was accompanied by characteristic dyspeptic symptoms. Taking these instances in connection with experiments on rabbits, when gastric congestion and marked duodenal injection were noted, it is quite likely that there is a connection between the administration of the drug and the appearance of the icterus. How the drug brings about these conditions is not easy to answer.—*Therapeutische Monatshefte*, 1895, Heft 9, S. 469.

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#### PETROLEUM-POISONING.

DR. CHEVES BEVILL reports a single case of a child, two and one-half years old who had drank some coal-oil. The symptoms noticed were stupor, pupils somewhat contracted, nystagmus, cold extremities, rapid pulse and respirations, and subnormal temperature. There were marked gastric irritations, difficulty of swallowing, slight suppression of urine, which later was shown to be albuminous. The throat was exceedingly red and appeared as if it were scalded. Recovery took place after twenty-four hours.—*Therapeutic Gazette*, 1895, No. 9, p. 604.

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#### EXERCISE AND FOOD FOR PULMONARY INVALIDS.

DR. CHARLES DENISON discusses various exercises which are intended to develop and to preserve the chest in health, and also presents the method of administration of food and its scope in the treatment of pulmonary invalids. With marked preference for nitrogenous food-stuffs, the arguments are brought forward fairly. A brief daily dietary is of practical value. Although nothing new is offered, the style in which this little book is written gives it a field of usefulness.

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#### FORMULARY OF PHARMACEUTICAL SPECIALTIES.

This very useful book by DR. M. GAUTIER and M. F. RENAULT takes up the composition, therapeutic indications, method of use, and the doses of various special preparations, and is intended for the use of physicians. In it we find many formulas, a considerable amount of information concerning the practical application of various wines, syrups, granules, tinctures, and pills more or less employed in this country. For instance, under colchicum we find the anti-gout wines of Anduson, the anti-gout pills of Lastigue, and the granules of colchicum of Houdé. We would criticise especially the indefiniteness of the composition of many, perhaps of most, preparations. Injection Brou is stated to be "prepared according to the formula of the Midi Hospital." "Élixir Virenque contains cocaine, pepsin, and diastase." If one has confidence in the dosage of the manufacturer, perhaps he may be content to be ignorant of the amount of each drug employed in the preparation. Yet the book will be useful for reference because it gives in a convenient form and in a general way the constituents of many preparations which bear the name of the originator.



The brief second part is a therapeutic index, in which these preparations are cited by name. The third part gives alphabetically these special preparations, and, lastly, the names and addresses of the manufacturers. The work will be of value chiefly to those who read French medical literature, although many of the titles are to be found in American and British journals and text-books.

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#### THE TREATMENT OF ANTERIOR URETHRITIS.

DR. RAMON GUITÉRAS treats his cases as follows: As a diluent, potassium acetate fifteen grains three times daily, then an astringent, hand-injection three times daily, of carbolic acid, alum, and zinc sulphate, of each five grains; glycerin, half an ounce; and distilled water, four ounces. On the first day at noon, after the patient has urinated, wash out the urethra with warm water and inject two drachms of one grain to the ounce silver nitrate solution, allowing it to escape immediately, and then wash out the urethra with a saturated solution of boric acid. On the second day use a two grains to the ounce solution, and increase the strength of the silver solution, each day, by one grain until the discharge has been stopped, or reduced to a slight moisture about the meatus, which condition is usually arrived at about the eighth day. This treatment should not be continued beyond the tenth day, when a ten grains to the ounce solution is given if necessary. After this the astringent hand-injections and diluents are kept up for a few days, and if some discharge still exists the silver solution may in some cases be continued, diminishing the strength by one grain to the ounce each day.—*Therapeutic Gazette*, 1895, No. 11, p. 721.

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#### THE USE OF CANTHARIDES IN ALBUMINURIA.

M. DU CAZEL calls attention to the observation of Lancereaux, made in 1892, concerning the benefit to be derived from the use of cantharides in albuminuria. Five cases are reported, four of which were completely cured by the use of the tincture, in doses of from four to twenty drops, while the fifth was considerably relieved. Of these cases, three were suffering from acute nephritis resulting from some ill-defined cause, perhaps *a frigore*; the fourth was consecutive to a pneumonia treated by cold water. The cases, reported in detail, seem to warrant the conclusions of the author.—*Gazette Hebdomadaire de Médecine et de Chirurgie*, 1895, No. 43, p. 508.

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#### THE TREATMENT OF THE LIGHTNING-PAINS OF TABES.

DR. BLONDEL reports that a syphilitic tabetic was cured of unendurable and obstinate lightning-pains in the following manner: He lay upon his bed, drew his thighs upon his abdomen, and bent his legs so that the knees and chin were brought together. Then a strap was passed around his neck and popliteal spaces, tightened, and fastened by the patient himself, who remained in ball-like position for five minutes. After eight days of this treatment the pains disappeared. Upon their return the method was repeated once each month. For two years the pains have been absent. This procedure, the result of which is to lengthen the spinal cord, does not present the danger



of luxation of the cervical vertebræ and does not require an especial apparatus.—*Therapeutische Monatshefte*, 1895, Heft 10, S. 566.

#### THE TOXINS OF ERYSIPELAS AND BACILLUS PRODIGIOSUS.

DR. NORVAL H. PIERCE reports the results of treatment of two cases of sarcoma involving structures within the nasal cavity. The first, myxosarcoma beginning in the middle turbinated body, received in all two drachms of the toxin in three months; the last injection being unusually large, severe reaction occurred, so that further treatment was refused. Later the upper jaw was removed and the patient was *in extremis* from extensive recurrence. The second was one of post-nasal fibrosarcoma. Nearly one drachm of the toxin was used, but the growth increased in size. The superior maxilla was cut away and the tumor removed, death resulting within twenty-four hours. These cases are reported as undoubted and complete failures with the anti-toxins used in sarcomata. Whether the different results of different observers are due to difference in the toxins used, one cannot say. In these cases five specimens were employed from as many different lots, and they all gave uniformly negative results.—*Chicago Medical Recorder*, 1895, No. 1, p. 23.

#### LYCETAL.

DR. W. E. ANTHONY claims that this drug, which is dimethyl-piperazine tartrate, possesses advantages, as a solvent of uric acid, over the alkaline salts of lithium, sodium, and potassium in its power of dissolving not only the outer layers of uric acid, but in disintegrating and removing the albuminous nucleus. It is more diuretic than is piperazine, because the tartaric acid in the system is converted into a carbonate and renders the blood more alkaline. The amount employed is from fifteen to forty-five grains in aqueous solution, which is of an agreeable acid taste, and its prolonged use does not excite repugnance. Six cases are briefly reported.—*New England Medical Monthly*, 1895, No. 9, p. 417.

#### UROTROPIN.

DR. ARTHUR NICOLAÏER reports that this drug, which is known chemically as hexamethylentetramin, is formed by the union of formaldehyde and ammonia, and can be used in adults in doses to ninety grains daily without unpleasant results. Diuresis is increased, the uric acid and sedimentous urates no longer appear. It is further found to be especially adapted for the treatment of uric-acid calculi, dissolving them, but only until the drug is all excreted. The amount usually employed is fifteen to twenty-two grains, taken at one dose, in the morning, dissolved in water. While the patients are taking this drug the urine remains clear and retains its acid reaction at the body-temperature, even if a few drops of urine in a state of ammoniacal fermentation were added to it; even after inoculation with pure cultures of the bacterium coli commune, urine remained sterile at blood-heat. From this observation it was suggested that the drug would be of use in preventing the development of micro-organisms, such as the bacteria of ammoniacal decomposition and the bacterium coli commune, which latter, as is well known,

is a factor in many of the bacterial diseases of the urinary passage. Two instances are cited in which substantiation is found for this belief. For this purpose seven to twenty-two grains per day are required.—*Deutsche medicinische Wochenschrift*, 1895, No. 34, S. 541.

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#### SALINE BATHS IN GRAVES'S DISEASE.

DR. CLAUDE WILSON reports a single instance in which marked symptoms were found. [The saline baths (Schott method) have already been noticed in this JOURNAL, 1895, No. 274, p. 205.] The rules to be observed are: (1) Begin with weak baths free from carbonic acid and slightly below blood-heat. (2) Gradually increase the strength and duration and lower the temperature. (3) Add free carbonic acid to the stronger bath. (4) Lie down for an hour after each bath. (5) Never give baths for more than four consecutive days without an interval. With the exception of the third and fifth, these rules were adhered to in the case reported. The improvement was very marked.—*The Practitioner*, 1895, No. 327, p. 227.

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#### THE THERAPEUTIC ACTION OF HOT SULPHO-SALINE WATERS.

DR. LEWIS R. MORRIS, from his personal observations made at Glenwood Springs, Colorado, concludes that the beneficial results are brought about by the effect on the system of several factors. These, he believes, are: (1) The pure air and high altitude, which increase the elimination of carbon dioxide and the oxidation of the blood and the number of respirations per minute. (2) The marked diaphoretic action on the skin, relieving the work of the kidneys and eliminating the waste materials from the blood resulting from the condensation of the cyan-alcohols. (3) The action on the liver from drinking the water, increasing the excretion of bile. (4) The correction of the catarrhal condition of the stomach and intestines, increasing the appetite and assimilation of food. (5) The increased action of the circulation and the absorbent system. (6) The evident soothing effect on the nervous system of the vapor-caves in an excited or inflamed condition of the nerves and the stimulating effect upon a general nervous depression. (7) Probably in no disease are these waters specific unless it be lead-poisoning.—*New York Medical Journal*, 1895, No. 878, p. 393.

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#### DISTILLED EXTRACT OF WITCH-HAZEL.

DR. W. D. HOFFKEN seeks to ascertain to what the merits of this preparation should be ascribed. Following the directions for the preparation of the aqua hamamelidis of the National Formulary a product is obtained which contains 15 per cent. of 94 per cent. alcohol, together with such substances as are dissolved from the leaves, etc., during the process of maceration and distillation. All investigations hitherto directed toward the discovery of any active principle possessing the wonderful healing properties ascribed to the extract of witch-hazel have been barren of results, unless we except a small quantity of volatile oil, to which the peculiar odor is due, and the alcohol which has been added as a preservative. The

conclusion is inevitable that the only active principle is the added alcohol. Of seventeen samples of various makes which were analyzed the volume-percentage of alcohol varied from 8 to 12.79. In all cases the acid reaction was due to the presence of a small quantity of acetic acid. Distilled extract of witch-hazel is nothing more or less than a highly diluted alcohol, containing traces of valueless extractive matter and a small quantity of a volatile oil to which its peculiar and agreeable odor is due.—*Bulletin of Pharmacy*, 1895, No. 9, p. 393.

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## MEDICINE.

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UNDER THE CHARGE OF

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AND

GEORGE DOCK, M.D.,

PROFESSOR OF MEDICINE IN THE UNIVERSITY OF MICHIGAN.

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### SPASTIC PARAPLEGIA.

DEJERINE and SOTTAS report an interesting case which they think demonstrates the possibility of a spastic paraplegia due to primary lesion of the lateral columns.

The patient was a man, aged sixty-two years, with no previous history of syphilis, but with a history of moderate alcoholism and of rheumatism. At the age of forty-two he was attacked with a passing feebleness of the lower limbs. After a short time loss of power of the legs gradually returned, accompanied by slight lancinating pains; the loss of power gradually increased. The patient was under the care of the authors for five years with the signs of a spastic paraplegia of moderate intensity. In repose the muscles were rigid, with almost complete retention of muscular force, except for slight paresis of the right leg. Sensibility was intact, there was no muscular atrophy, nor were fibrillary contractures present. The electrical reactions were normal. The knee-jerks were increased, and double ankle-clonus was present. The gait was typical. No Romberg's sign. The sphincters only slightly affected.

The patient finally succumbed to pneumonia twenty years from the onset of the nervous symptoms.

At the autopsy no gross lesions were to be made out. The motor cortex, the two internal capsules, the peduncles, the bulb, and the cord were all examined, the only lesions present being in the cord. The lesions consisted of a well-marked sclerosis of the lateral columns and a slight area of sclerosis in the centre of the column of Goll. The lateral sclerosis was most marked in the dorsal region. From the absence of lesion in the other parts examined the authors regard the case one of primary sclerosis of the lateral

columns; they mention a similar case reported by Strümpell, but state that in it the involvement of the columns of Goll was not observed, and that the disease of the lateral columns was not so extensive as in their case.—*Comptes Rendus Société de Biologie*, December 6, 1895.

#### PNEUMO-PALUDISM OF THE APICES.

In a recent article DE BRUN has described a pulmonary affection occurring in connection with malaria and involving the apices of the lungs, to which he has given the above name.

The affection he describes may be present in two forms: an acute or a chronic, both occurring in connection with the more chronic forms of malaria associated with cachexia and marked visceral changes.

The disease is rather more common in females than in males, and occurs in young people, nearly all the cases occurring between five and thirty years of age.

Symptoms pointing directly to the lungs may be entirely absent or may be marked. When present they are cough and expectoration. The cough may be insignificant, or may be violent, incessant, and fatiguing, keeping the patient awake at night; it is nearly always dry. When expectoration is present it is slight and mucoid in character, looking much like saliva.

The two forms present the same symptoms and physical signs. The physical signs consist of an increase of vocal fremitus, slight dulness on percussion over the affected area, and marked tubular breathing often with bronchophony. The most striking physical sign is the entire absence of râles.

In two cases of the acute form coming to autopsy under de Brun's care no pulmonary lesions whatever could be made out. The chronic cases showed either cornification or sclerosis.

Tubercle-bacilli were never found in the sputum in any case, and marked malarial symptoms were always present, with pigment in the blood during the paroxysms.

The prognosis of the affection is good. The acute cases clear up rapidly under quinine, though the chronic cases take more time and are some of them incurable.—*Revue de Médecine*, May and November, 1895.

#### PYLEPHLEBITIS AND ABSCESS OF THE LIVER FOLLOWING TYPHOID.

LANNOIS has recently described pylephlebitis and abscess of the liver following typhoid, in which the bacillus of Eberth was present in the pus from the abscess, though not in pure culture.

He states that liver-abscess following typhoid is very rare, occurring, according to Schultz, of Hamburg, once in thirty-six thousand and eighty cases.

Lannois divides abscess of the liver following typhoid into three classes:

a. Metastatic abscesses having an external suppurative focus as a point of origin.

b. Abscesses from typhoid ulceration of the biliary passages.

c. Abscesses due to pylephlebitis.

He places his case in the last class.

The case occurred in a man of twenty-eight years of age, and came on at



the end of the attack, the patient having been afebrile for three days. At the end of this time he was taken with a violent chill with fever, and the signs of pleural involvement at both bases. This was followed by swelling of the abdomen and great pain in the right hypochondrium. There were no positive physical signs in the abdomen, and the case was regarded as one of tubercular peritonitis on account of the pleural involvement and the swelling of the abdomen.

The patient died three days after admission, the autopsy showing healed ulcers in the ileum, and also partly healed ones, both in this part of the intestine and in the appendix. The vena portæ, the inferior mesenteric vein, and the splenic vein all contained adherent ante-mortem clots. In the liver a number of abscesses were found containing creamy yellowish pus. A number of organisms were present in the pus, and one was isolated which resembled the typhoid bacillus in every way, except that it slightly liquefied gelatin. The author ascribes the liquefaction to impure culture, and states that this is the only case recorded where a satisfactory bacteriological examination has been made.—*Revue de Médecine*, November, 1895.

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#### HYPOTHERMY.

ISCOVESCO relates an interesting case of hypothermy in a case of general paresis.

The patient was a paretic of four years' standing, the disease being in the demential stage. Following a period of excitement the patient passed into one of depression, with great lowering of the body-temperature. The temperature in the evening of the day on which the depressed attack began was 30° C. (86° F.), and by the next evening had fallen to 28° C. (83° F.). The following day the patient died. Besides the usual lesions of general paresis the autopsy showed a marked arborization of the protuberential vessels and a dilatation of the basilar artery.—*Comptes Rendus Société de Biologie*, November 29, 1895.

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#### ULCERATIVE ENDOCARDITIS DUE TO THE GONOCOCCUS.

In a recent number of the *Archives de Médecine Expérimentale*, THAYER and BLUMER report an interesting case of gonorrhœal septicæmia with endocarditis due to the gonococcus.

After speaking of the unsatisfactory evidence in many of the reported cases that the organism present was the gonococcus, the authors give the history of their case:

The patient was a female, thirty-four years of age, who entered the Johns Hopkins Hospital complaining of cough, feebleness, and general pains. The family history was negative, but she gave a previous history of two miscarriages. The present illness dated from an attack of rheumatism, which occurred three months previous to admission; in this attack most of the joints were affected, the pain being acute and passing rapidly from one joint to another; it was accompanied by very little swelling. The day previous to admission the patient had a severe chill.

On admission examination showed a slight enlargement of the heart, with a presystolic thrill at the apex; in the same region two murmurs were to be

heard, a light sharply localized presystolic murmur and a soft systolic transmitted to the axilla and the base; the second pulmonic sound was accentuated. No malarial organisms were found in the blood. From the time of her entrance to that of her death, nineteen days later, the patient gradually emaciated; during this whole time she had daily exacerbations of temperature at very irregular intervals, and often accompanied by severe rigors.

Both the heart-murmurs had increased in intensity before death. The patient became very anæmic, the red corpuscles at the time of death numbering only a few over a million. The spleen was palpable from the first.

The autopsy, made two hours and a half after death, showed an acute ulcerative endocarditis of the mitral valve, subacute spleen-tumor, and infarcts in the lungs and spleen.

Microscopical examination showed the presence of gonococci in the valvular vegetations.

Cultures made from the blood during life on a mixture of blood and agar resulted in the growth of an organism morphologically resembling the gonococcus, decolorizing by Gram's method, and refusing to grow on ordinary media.

Cover-slips made at the autopsy from the vagina, uterus, and vegetations on the mitral valves showed a similar organism, which likewise failed to grow on ordinary media, and which decolorized by Gram's method. A mouse inoculated at the root of the tail with a portion of the valvular vegetations did not react.

The authors conclude that they are justified in believing that the organism isolated from the blood during life, and found on the valvular vegetations at autopsy, was the gonococcus, for the following reasons:

- a. Its form and disposition were characteristic.
- b. Though often free, the organism was often found within the protoplasm of the leucocytes in the valvular thrombus.
- c. The organism did not develop on ordinary media.
- d. It easily grew on a mixture of human blood and agar (one-third blood).
- e. It decolorized by Gram's method.—*Archives de Médecine Expérimentale*, November, 1895.

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#### TYPHOID FEVER.

STERN (*Volkman's Sammlung klinischer Vorträge*, No. 138) has published another suggestive paper on typhoid fever. In the first place, he considers the alleged protective action of the gastric juice, and shows by various experiments that the protection the stomach may offer against the entrance of typhoid bacilli must be very uncertain. "Only in cases of hypersecretion with hyperacidity, in which there are large quantities of free hydrochloric acid in the stomach, can we hope that all infectious organisms introduced will be rapidly destroyed." Under normal conditions organisms less resistant to hydrochloric acid than typhoid bacilli can pass the stomach and be cultivated from the feces.

The question as to the presence of typhoid bacilli in the blood was tested in six cases, with positive results in three; twice in blood from roseolæ and once in blood from a vein. In the negative cases the blood was examined only once in two of the three cases. In the third case, confirmed by autopsy,

three examinations were negative. In the cases with positive results the number of colonies was always small, as has been found by other investigators. The bacilli were found between the ninth and twenty-fifth days of the disease. The question whether the blood from the spots or that from the veins is most favorable requires further investigation.

With regard to the blood-serum, Stein found no reason to think that acquired immunity depends on it. The bactericidal action of the serum of patients after typhoid fever was found to be less than that of persons who had never had the disease. The author thinks immunity in such cases depends rather on a change in the body-cells or their functions. Nevertheless, the serum of persons who have just recovered from typhoid fever has a protective action, but this varies so much in different cases that experiments on men should only be made with such serums as, according to experiments on animals, have an especially potent action. At present, the serum of inoculated animals is more promising than that of convalescent men.

Experiments with the effect of high temperature on cultures of typhoid bacilli showed that even high febrile temperature had no marked inhibitory action.

Finally, the question of intestinal antiseptics was carefully investigated, and the conclusion reached that the best and safest methods of rendering harmless infectious germs in the intestines is by mechanical removal, either by cathartics or by high enemata.

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#### RENAL CALCULUS FOLLOWING CHOLERA MORBUS.

EICHHORST reports an interesting case (*Deutsche med. Wochenschrift*, 1896, No. 48) which appears to be unique.

The patient was his son, a lad of ten years, who acquired severe cholera morbus at a summer-resort. During the early days of the attack the urine showed no change. On the fourth day, while the stools were still frequent and bloody, and the urine was passed with the stools, the patient felt a burning pain at the end of urination. Later, the pain was felt in the glans, behind the symphysis, and in the left renal region. The pain became more severe, with strangury. On the following day the urine was dirty brown in color, and contained a large number of small, round, or lenticular, reddish-yellow calculi from the size of a poppy-seed to that of half a pea. The calculi were mostly hard. The urine also contained blood-clots. Microscopically, in addition to blood-cells, large numbers of uric-acid crystals were present, especially of the form claimed by Ultzmann as characteristic associates of urinary calculi. The condition lasted for two days longer, with treatment by milk-diet and Fachingen water, and then complete and permanent recovery followed.

That disturbances of the stomach and bowels, especially in children, often lead to excretion of uric-acid crystals is well known, but the occurrence of actual calculi under such circumstances seems hitherto undescribed. The author recalls the cases, one of which is cited in his text-book, in which a small quantity of white wine caused renal calculi. He now gives the history of a second case of the kind in a man of fifty years. As in the former, red wine never had the same consequences.

### THE OCCURRENCE OF CASTS IN THE URINE WITHOUT ALBUMIN.

KOSSLER (*Berliner klin. Wochenschrift*, 1895, No. 14) has investigated this subject and has been able to examine in all twenty-nine cases, most of them in patients with infectious diseases or intoxications. There were eighteen cases of chronic pulmonary tuberculosis, and in these there were not only hyaline and granular, but also epithelial, leucocytes, waxy, and even blood-casts. In most of the cases the urine contained nucleo-albumin in various quantities. Anatomically, the idea that the nucleo-albuminuria and casts are due to renal alterations was borne out by examination in twelve of the cases of tuberculosis. Marked inflammatory changes were not to be found, neither was there infiltration around nor exudate in the glomeruli. On the other hand, the tubular epithelium showed granular and cloudy change and degeneration in various stages up to complete necrosis. The changes were not uniform, however, but in scattered foci in the kidneys.

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### HEMORRHAGIC DIATHESIS IN THE NEWBORN.

FINKELSTEIN (*Berliner klin. Wochenschrift*, 1895, No. 23) reports the case of a newborn infant dying of the hemorrhagic diathesis. In the organs a specific bacillus was found, cultures of which caused a typical hemorrhagic diathesis when injected into rabbits. The organism resembled the one found by Kolb in three cases of purpura hemorrhagica, and called by the latter *b. hemorrhagicus*. In Finkelstein's case the mother was syphilitic, but the author looks on the specific disease not as the direct cause of the hemorrhagic diathesis, but only predisposing to the latter process, in which pyæmic or septic infections bring about the characteristic changes.

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### THE DIAGNOSTIC VALUE OF THE COUNTING OF LEUCOCYTES IN URINE.

REINECKE (*Berliner klin. Wochenschrift*, 1896, No. 49) has made some investigations in this subject with the result of adding greatly to the knowledge already available regarding it. An interesting feature of theoretical importance was the confirmation of Hottinger's discovery that leucocytes in pyuria often exceed in the course of a day the total number of leucocytes in the blood, thus casting doubt on the idea that pus-corpuscles are all derived from the leucocytes of the blood. The practical results of the investigation are stated in the following conclusions: 1. Counting the pus-cells in urine frequently, but not invariably, gives an exact measure of the excretion of pus. 2. Continued daily estimations give a picture of the clinical course, enable us to control the treatment, and give an interesting idea of the enormous number of cells lost by the body in severe pyuria. 3. In connection with albumin-estimations the quantitative estimations of pus may in some cases assist in determining whether a pyuria is complicated by nephritis.

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### TUBERCULAR ENDOCARDITIS.

LEYDEN, in a recent paper before the Berlin Verein für innere Medizin (*Berliner klin. Wochenschrift*, 1896, No. 49), spoke at length on the connection of disease of the heart and tuberculosis. Besides giving a review of the his-



torical aspect of the subject he mentioned some recent observations made in his clinic. In four cases of recent warty endocarditis tubercle-bacilli were found in the lesions. One of the patients, a woman, admitted with advanced tuberculosis, had a history of rheumatism. There was a systolic murmur. From the progress of the case a fresh endocarditis was diagnosed. An autopsy confirmed the diagnosis. Tubercle-bacilli were present not only in the vegetations, but also in ante-mortem thrombi. An interesting feature was that the bacilli were largely in the cells. Leyden thinks that the bacilli do not enter the cells in the vegetations, but are transported by the cells, so that the latter, so far from protecting the body against infection, favor the spread of the bacilli.

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#### THE RELATIVE FREQUENCY OF THE SYMPTOMS OF TABES DORSALIS.

LEIMBACH has tabulated the histories of 400 cases of tabes in Erb's clinic, with the following results: Tabes began with lancinating pains in 67 per cent. of cases; bladder-symptoms in 22 per cent.; disturbances of the sexual functions in 15 per cent. On the whole, the knee-jerk was absent in 92 per cent. of cases; lancinating pains present in 88 per cent.; pupil-symptoms in 70 per cent.; impotence in 58 per cent.; "girdle" sensation in 31 per cent.; optic atrophy in 6.7 per cent.; and crises in only 5 per cent. (*Deutsche Zeitschrift für Nervenheilkunde*, Band vii. Heft 5 und 6).

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#### ON UROBILIN.

JOLLES thus sums up the results of his studies on urobilin (*Centralblatt für innere Med.*, 1895, No. 48):

1. The normal coloring-matter of urine is most probably identical with the most advanced product of oxidation of bilirubin; other coloring-matters occasionally occur in urine which differ from the normal only in the amount of oxygen they contain.

2. The coloring-matter known as urobilin (hydrobilirubin) can be separated into two kinds: physiological and pathological. The imperfectly oxidized coloring-matters belong to the physiological urobilins.

3. With the latter should be classed the substances which cause normally colored urine to become darker on standing.

4. The two varieties can be distinguished by the fact that physiological urobilins do not produce fluorescence after oxidation with alcoholic iodine-solution or nitric acid, nor give a characteristic spectrum after complete oxidation, as do the pathological varieties.

5. In order to avoid confusion it is necessary to isolate the urobilins and then to examine them.

6. The sources of pathological urobilin are coloring-matters of bile and blood.

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#### TROPICAL MULTIPLE NEURITIS.

GLOGNER claims (*Virchow's Archiv*, Band 141, Heft 3) that two classes of beri-beri can be distinguished, viz., those with enlarged spleen, frequent or intermittent pulse, and atypical fever, or rarely with splenic enlargement and

slight fever without frequent pulse, and those in which all these symptoms are absent. Some of the cases are due to malaria, others not. In the latter the blood from the fingers shows no parasites. The blood from the spleen, however, contains pigmented bodies somewhat resembling those of malaria.

They differ from the latter in containing pigment at an earlier period, in a greater amount of pigment, which is arranged in a circular form, and in being extraglobular. The parasites were present in a majority of cases; where they are absent Glogner thinks the neuritis is the sequel of an infection. The pigmented parasites are not always associated with neuritis, but sometimes occur with irregular fever and enlarged spleen.

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#### LUMBAR PUNCTURE.

In an interesting article on the above subject, JACOBY reports two cases of spinal hemorrhage in which this procedure was made use of with beneficial results.

Both cases followed direct injury from falls, the symptoms being a more or less complete numbness of the lower extremities, with loss of control over the sphincters and anæsthesia below the point of injury. The numbness of the limbs followed shooting-pains in the back in both cases. The objective signs were bruising of the integument over the injured area, without signs of fracture or dislocation, and the numbness and loss of power above mentioned. The diagnosis was made in each case of intrameningeal spinal hemorrhage with compression of the cord.

In one instance fifteen and in the other twenty cubic centimetres of blood were drawn by lumbar puncture, confirming the diagnosis. One patient who had had marked pressure-symptoms very quickly showed improvement following the procedure, but a certain amount of weakness of the lower limbs remained permanently.

In the second case the recovery was slower, but more complete. Jacoby does not insist on the curative agency of the lumbar puncture, but holds that at any rate it must reduce the local pressure, and leave less blood in the spinal canal to be absorbed. Of the diagnostic value of the procedure in similar cases there is no doubt.—*New York Medical Journal*, January 4, 1896.

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#### HÆMATOGENOUS JAUNDICE.

In a recent and interesting paper AULD discusses the possibility of a true hæmatogenous jaundice, a possibility which he states has been doubted in the last few years.

After tracing the gradual development and overthrow of various theories relating to the subject, he refers to the experiments made by himself.

The experiments were made upon rabbits which were poisoned by phenylhydrazin, either alone or in combination with metaphenyldiamin. These poisons caused Gmelin's reaction for bile to present itself in the urine for a few days, and in some cases actual jaundice was to be made out in the animal experimented upon.

The histological appearances varied according to the intensity of the poisoning. In acute poisoning there was much pigment in the liver-cells,

and tremendous pigment-formation in the spleen, with extensive destruction of red blood-corpuscles by the spleen-cells.

In the chronic form of poisoning the same tremendous formation of pigment in the spleen with blood-destruction was observed; in the liver the portal veins and capillaries were stained with pigment, but the liver-cells, which were in a state of fatty degeneration, were practically free from pigment. In the kidney, in this form of poisoning, the pigment was found in the renal veins and among the cells of the convoluted tubules, whilst the lumina of the straight tubes in the pyramid was often chockful of it. There was no blood-destruction in the general circulation.

From these findings the author concludes that in these cases we are dealing with a blood-destruction taking place in the spleen with elimination of the products of destruction by the liver.

A true hæmatogenous jaundice can be produced when two conditions are present: 1. The extensive blood-destruction. 2. The failure of the liver-cells to deal adequately with the destruction-products, in which case they are absorbed into the blood.

This latter condition is proved to be possible by the results of the chronic cases of phenylhydrazin- and metaphenylenediamin-poisoning, where the liver-cells had undergone degeneration and were not taking care of the pigment, and where actual jaundice was observed to occur.—*British Medical Journal*, January 18, 1896.

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#### SOMNOLENCE AND NARCOLEPSY OF HEPATIC ORIGIN.

LEVI, in speaking of the nervous symptoms of hepatic disorders, says that in order that the existence of these may be admitted there must be indisputable hepatic lesions with the exclusion of lesions in other organs, particularly the kidneys, and that no infectious or toxic condition must be present which could explain the symptoms. It is also necessary to eliminate the nervous symptoms of grave icterus, of which the purely hepatic origin is doubtful, of puerperal eclampsia, and of delirium tremens, in which latter, however, the liver no doubt plays some part.

Levi reports two cases, in one of which somnolence was constantly present during the early stages of a cirrhosis, and in the other intermittent narcolepsy occurred in relation to cholelithiasis.

In the first case the patient was taken with attacks of sleepiness in an early stage of the cirrhosis, he would sleep all day on holidays, only waking up for his meals, and had difficulty in keeping awake at his work, sometimes even going to sleep over it. After death, which was due to severe hepatic symptoms, a well-marked cirrhosis was found, and no appreciable lesions were made out in the other organs.

The second case occurred in an individual with attacks of hepatic colic, during which she was seized with intense drowsiness, and usually slept soundly; between attacks she was perfectly wakeful, the drowsiness coming on again with the onset of the pains.

Levi states that the significance of the somnolence varies, at times being totally unaccompanied by grave symptoms, at times appearing as a precursor of symptoms of the greatest gravity.—*Archives Générales de Médecine*, January, 1896.

THE DIFFERENT VARIETIES OF GALL-STONES.

HANOT and LETIENNE publish an interesting note based on their extensive researches on biliary calculus.

They divide calculi into those of microbic and non-microbic origin. The fresh microbic calculi they describe as of irregular form, vaguely round, raspberry-like, and apparently constituted of numerous small elementary concretions, many of which are to be seen free in the bile. These stones are not faceted, and resemble, as far as form is concerned, dried breadcrumbs. Their crystalline arrangement is not regular, and they are not laminated. They are relatively soft in consistency, and crumble when pressure is applied, and may or may not have a central nucleus. Their color is generally pale. The old concretions of microbic origin correspond to the ordinary description of biliary calculi, occurring either as the solitary, ovoid, laminated stone, or the multiple faceted stones, also having a laminated structure and usually a central nucleus.

The calculi not demonstrated as of microbic origin were only observed in cases where there was complete obstruction of the main ducts due to pressure from without, and not to stone.

These calculi are remarkable for their irregularity of form; they are amorphous, and show numerous indentations on their surface, containing yellow bile-pigment, and contrasting strongly with the almost black color of the stone itself; they are very hard, and not faceted. The authors state that the organism almost invariably connected with the stones of microbic origin, and found also in the bile in these cases, was the *bacillus coli communis*. — *Comptes Rendus de la Société de Biologie*, December 27, 1895.

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HÆMATEMESIS OF INFECTIOUS ORIGIN.

In a recent article RONDOT reports two interesting cases of hæmatemesis associated with inflammatory disease of the bile-passages.

Both cases occurred in middle-aged individuals with the history, and in one case the physical signs, of gastric ulcer, and both had had abundant hæmatemesis, which came on shortly after the appearance of signs indicating an acute infection, viz., fever, enlarged spleen, and a heart-murmur. No history of hepatic disease could be elicited in either case, nor were physical signs present suggesting such disease. Jaundice was absent in both cases. Both cases died with all the signs of an acute infection. The autopsy in each case showed inflammation of the biliary passages: in one case a general angeiocholitis, in the other a cholecystitis. Besides these findings general infection was evidenced in each case by the enlarged soft spleen and the presence of a fresh vegetative endocarditis, accompanied in one case by pneumonia.

No ulcer of the stomach or duodenum was present in either case, nor was there varicosity of the veins of the œsophagus or erosion of its mucous membrane.

The author regards the hæmatemesis as being of infectious origin, and due to the action of the bacterial poisons upon the vaso-dilator fibres of the depressor nerve of Cyon and Ludwig, and concludes that these cases are the



certain proof that gastro-intestinal hemorrhages of infectious origin can occur as a consequence of inflammatory conditions of the biliary passages.—*Archives Cliniques de Bordeaux*, December, 1895.

## SURGERY.

UNDER THE CHARGE OF

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### A NEW OPERATION FOR NEPHROPEXY.

VULLIET (*Rev. Méd. de la Suisse Romande*, 1895, No. 6) describes the following operation, which, after a series of experiments on large dogs, he performed successfully with the assistance of his collaborator, POULLET.

The principle involved in the operation is the fixation of the kidney by means of a tendon, which has for its point of attachment the spinous process of the first lumbar vertebra. His experiments and specimens demonstrate that a tendon is capable of living if its original attachment is left intact. The operation consists of four stages. The first is the ordinary lumbar incision exposing the kidney. The wound is tamponed during the second stage. The patient is then placed in a convenient position and an incision made, three-quarters of an inch from the dorsal spines and parallel to them on the same side as the previous incision, and three inches in length, the middle of the incision corresponding to the spine of the first lumbar vertebra. After the skin has been incised the deep fascia is carefully divided upon a grooved director. The tenacious fascia by which the spinalis dorsi is attached to the vertebral spines is exposed, the one which is inserted into the first lumbar vertebra is raised upon a grooved director until two fingers can be inserted beneath it and gentle traction made until it is torn away from its muscular attachment above; it then measures eight to nine and one-half inches in length. The few muscular fibres that remain attached to it are removed and the operation proceeded with as rapidly as possible.

In the third stage of the operation the lumbar incision is opened, and by means of bimanual palpation the space between the twelfth dorsal and first lumbar lateral spines mapped out. The muscular layer intervening is then pierced by a stylet from within outward, the tendon threaded into it and drawn through the intervening tissues into the perirenal space.

The fourth stage is then completed by the drawing up of the kidney into

the wound as far as possible, and the passage of the tendon as a seton beneath the capsule of the kidney on the posterior surface near to its external border from the juncture of its third and lower fourths upward to the juncture of its upper and second fourths. For this purpose they employed a small spatula a little wider than the tendon and provided with an eye, to which the tendon was attached by a suture. After its passage, the tendon still protruded slightly, the kidney was returned, and the suture passed outward through the muscular parietes and fastened by silver-wire sutures in the wound, the ends of the suture afterward being carried to the edge of the wound. A second silver suture was placed beneath the other end of the tendon in order to control it later.

The healing was apyretic. During the first twenty-four hours there was some nausea, due to the chloroform, with vomiting once or twice, during which the patient felt the pain in the lumbar region. She, however, felt no pain in the back where the tendon had been torn away, and even on pressure did not realize that anything had occurred there. There was no collection either sanguineous or serous at that point.

The sutures were removed on the eighth day, when primary union was complete; the patient sat up from that time on. The seventeenth day after operation the patient got up and walked, sitting up for several hours; she made her bed and cared for herself without experiencing fatigue or pain. There was an apparent displacement of the kidney, due to the swelling about the part, but a later examination showed the position to be perfect, and it was impossible to move the kidney, an essential factor. The patient was seen and examined twenty-four days after operation, when it was found impossible to grasp the kidney and draw it down.

The operation produces a large traumatism, but not a serious one, as it lies entirely external to the peritoneum.

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#### FAT-EMBOLISM.

DR. GROUBÉ (*Rev. de Chir.*, July, 1895) reports a case of death from fat-emboli following a serious accident. The review of the literature on this subject, and the observations made in the case reported, led the author to the following conclusions:

1. Although cerebral fat-emboli are very rare, the danger and possibility of their occurrence should not be lost sight of in cases where there are large lesions of the skeleton and soft parts.

2. In all cases of severe contusion and fracture the author advises the examination of the urine for fat; these examinations should be made every day for three weeks.

3. The quantitative estimate of the amount of fat in the urine permits one to judge of the amount of free fat circulating in the blood. It is probable that these amounts are in inverse ratio, the more that is excreted the less remains in the system. The diminution of the amount of fat in the urine and an increased difficulty in respiration are indications of approaching danger.

4. The author calls particular attention to the difficulty of respiration

shown by these patients and their lowered temperature. These signs should put one on his guard.

5. The literature of the subject and the mode of origin of these emboli indicate complete rest as the treatment for the fractured limb. The general rules for the treatment of fractures—*i. e.*, complete immobilization of the fragments—is applicable to these cases; and where in compound fractures it is necessary to reapply the dressings, it should only be done as frequently as is absolutely necessary.

6. Massage should not be employed, as it tends to drive the fat into the tissues. In the case of contusions of the soft parts massage should be applied only at a late stage when the extravasated blood will not disappear.

7. Frequently contusions produce vast cavities filled with blood and liquid fat. In these cases, to prevent this complication, the author advises that these sacs be incised and evacuated, which also hastens the recovery. This evacuation renders the formation of emboli difficult, as it relieves the internal tension. This relief of tension should be also afforded after the resection of a joint.

8. In refraining from amputation the danger of fat-emboli should be considered.

9. As soon as emboli form all assistance that is possible should be given to the kidneys to aid them in the elimination of the fat, and to assist the heart in its action in compensating for the condition of the lungs. These results are obtained to a certain extent by the use of cardiac stimulants and diuretics, more especially digitalis.

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#### FLOATING BODIES IN JOINTS.

In discussing this subject after a report of three interesting cases, HALSTEAD (*Annals of Surgery*, September, 1895) draws the following conclusions:

1. That the etiology of some of these bodies is yet not fully understood; but that the condition described by König under the name of osteochondritis desiccans explains the most of those that are found in otherwise normal joints. This deserves further investigation.

2. That few, if any, are the direct result of violence.

3. That the most pronounced symptom is the sudden onset of severe pain in the joint with locking of the joint, usually in a nearly extended position, this being followed by acute inflammatory processes in the joint involved.

4. That the lengthening of the femur (in movable bodies in knee) may occur as a result of irritation produced by the pressure of these bodies.

5. That the only treatment for this condition is the removal by direct incision, preferably under cocaine-anæsthesia, as soon as the diagnosis is made.

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#### A CRITICISM OF THE CANCER-SERUM OF EMMERICH AND SCHOLL.

The method of treating cancer reported by these authors is severely criticised by PETERSEN (*Deutsch. med. Wochens.*, 1895, No. 20), as the authors claimed for their method results which even the meagre number of cases reported did not justify. They made their report before a sufficient time had elapsed to make their observations of any value, and while the results

they had obtained were so deficient that they could scarcely any of them be called cures. The author deplors the rashness with which men of repute rush into print before they have sufficient clinical proof to base their opinions upon, and before sufficient time has elapsed to make their clinical observations of any value.

BURNS (*Ibid.*) reports his observations in six cases in which he tried the erysipelas-serum. He also criticises severely the conclusions of Emmerich and Scholl, and states that in his cases he saw no favorable action upon the tumors, neither retarding of the growth nor decrease in their volume, while he did observe very decided toxic action and increase of temperature after the injections. He believes, however, that these poor results should not militate against the efficacy of the serum-therapy in other diseases or its possibilities.

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#### A CASE OF HYDATID CYST OF THE LIVER.

PANTALONI (*Arch. Prov. de Chir.*, June, 1895) reports an interesting case of hydatid cyst of the right lobe of the liver, situated postero-inferiorly. The cyst was incised and partially excised by a median laparotomy, the patient recovering.

The author draws the following conclusions from his observation of this case:

1. In cases of hydatid cyst of the postero-inferior portion of the right lobe of the liver, non-suppurating, a rare form, a successful operation may be performed by a laparotomy through the anterior abdominal wall.
2. The median laparotomy permits not only the easy incision and complete emptying of the cyst, but also the resection of a greater or less portion of the cyst-wall.
3. If the patient is made to sit up in bed at as early a date as possible, in operation by this method, and remain in this position as much of the day as possible, sufficient drainage will be obtained without the necessity of a lumbar incision.

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#### THE ACTION OF ETHER AND CHLOROFORM ON THE KIDNEY.

From a critical analytical study of 130 cases of narcosis in which the urine was examined prior to the operation and from three to six days after operation both by chemical analysis and microscopical examination, EISENDRATH (*Deutsch. Zeitschrift für Chir.*, 1895, Band xl. Heft 5 and 6) draws the following conclusions:

1. Albuminuria, which is already present, is increased more frequently by ether than by chloroform.
2. Albuminuria makes its appearance, however, more frequently after chloroform-narcosis than after ether-narcosis—that is, in the proportion of 32 to 25.
3. Their action is equal upon amyloid disease of the kidney.
4. Tube-casts, with and without albumin, are found with equal frequency after chloroform- and ether-narcosis, but disappear more rapidly in the case of ether. This harmful late action of chloroform upon the kidney has been proven to be greater than that of ether by E. Fraenkel.



The author reports in detail an interesting case of death following chloroform-narcosis, in which the pathological lesion was a necrosis of the parenchymatous cells of the kidney.

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#### THE TREATMENT OF WANDERING SPLEEN BY SPLENOPEXIE.

The result of physiological research has led to a clearer knowledge of the function of the spleen, and has shown how important its function is to the well-being of the whole system. SYKOFF (*Archiv für klin. Chir.*, 1895, Band li. Heft 3) calls attention to this fact, and shows from experiments which he has performed that the following conclusions may be deduced in favor of splenopexie as opposed to splenectomy :

1. By means of a catgut net the spleen may be fixed firmly and securely to the abdominal parietes.

2. For this purpose it is sufficient to fix only the middle half of the spleen.

3. The spleen is somewhat decreased in size by the contraction of the newly formed scar-tissue.

4. It retains its function.

5. The prime factor in the fixation are the connective-tissue bands, which replace the catgut.

6. Any form of irritation or scarification of the surface of the spleen is unnecessary and harmful, as it produces adhesions to neighboring structures—as the intestines—and the catgut, if not perfectly aseptic, is more liable to produce suppuration.

in regard to the physiological function of the spleen the author's conclusions are as follows :

1. Extirpation of the spleen can be possible without harmful results only exceptionally, and then only when the other blood-making organs are healthy.

2. Instead of splenectomy, in cases of local lesions, resection should be employed.

3. Splenectomy is indicated when the spleen is the seat of a primary tumor, though not in cases of secondary involvement; and finally in cases where the pathological changes are so great that there is no hope of the remaining portion assuming its normal function.

4. The wandering spleen must and can be fixed.

5. The spleen fixed by catgut has its normal function.

6. The fixed spleen decreases in size, which is of value in cases of hypertrophy.

7. When the spleen is prolapsed anteriorly an attempt should be made to replace and fix it.

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#### THE INFLUENCE OF ETHER UPON THE KIDNEYS.

WEIR (*New York Medical Journal*, November 16, 1895) reports an observation on 305 cases in which careful observation was made. Of these, 87 per cent. were normal before and after etherization; 13 per cent. were normal before and abnormal afterward; the albumin and casts, however, disappearing in a few days' time.

In regard to temperature-changes occurring within forty-eight hours after

an etherization, the urine was normal before and after etherization, accompanied by rise of temperature in 86 cases, of which there were: At 100°, 46 cases; 101°, 22 cases; 102°, 15 cases; 103°, 2 cases; 104°, 1 case. And that with urine normal before and afterward abnormal, accompanied by rise of temperature, 12 cases.

The conclusions arrived at, therefore, are as follows:

That etherization in the vast majority of cases in normal kidneys, and even in abnormal kidneys, brings about no detrimental effects; that when any evidences of abnormality present themselves they are transitory in character and not productive of harm; that elevation of temperature, which I had before thought would aggravate the work of the kidney and bring about in conjunction with an ether-narcosis abnormal excretions, does not appear to exercise any positive influence on this point.

#### A CASE OF DOUBLE ANEURISM OF THE SUPERFICIAL FEMORAL ARTERY.

SOUCHON (*New York Medical Journal*, November 2, 1895) reports the following interesting case of ligation of the superficial femoral for double aneurism, with recovery of the patient.

The patient was forty-three years of age, and had no history of any predisposing illness or habit. He presented at the opening of the great abductor of the left thigh an aneurism of the size of a cocoanut. Also at the apex of Scarpa's triangle another aneurism the size of a hen's egg. All the signs of aneurism were present; also œdema of the foot and leg and much pain. No other aneurisms were found, and the rest of the body was healthy.

All of the non-operative modes of treatment were thoroughly tried, but the lower tumor grew so rapidly that its rupture was apprehended, and the superficial femoral was ligated in the middle of Scarpa's triangle in spite of a bruised condition of the tissues from previous treatment. A double contiguous kangaroo-ligature was applied without rupturing the internal coat of the vessel. Five days later the dressing was removed, and the upper aneurism was found to be pulsating. The next day there was suppuration, followed three days later by hemorrhage, which necessitated the reopening of the wound and ligation with silk of the proximal end of the artery; the hemorrhage and pulsation of the upper aneurism ceased. The next day the pulsation returned in the upper aneurism; the lower had ceased pulsating for some time and had decreased one-third in volume. There was a second hemorrhage with subsequent ligation of both ends of the artery, when all pulsation stopped and never returned.

One month later the lower aneurism was incised, and soft, black clots removed. Also the removal of a silk knot from the bottom of a fistulous tract at the site of operation. At this point erysipelas was contracted. The patient, however, recovered with a suppurative arthritis of the knee-joint, which healed after incision and drainage. The patient left the hospital cured four months after operation.

The author draws the following conclusions from the case: (1) In cases of large aneurisms that are liable to take on a rapid growth the compress should not be tried, as a rapid increase in the tumor will make it necessary to oper-

ate through bruised tissue. (2) The ligature should be applied as close to the sac as the condition of the artery will allow—that is, if it is not thinned and dilated so as to shut out the collateral branches which caused the return of the pulsations in the upper tumor. (3) Should this fail, extirpation of the sac is the next thing in order, with or without the use of the Esmarch bandage and band. In case of high femoral aneurisms a provisional loop-ligature, after the manner of Rivington and Treves, should be applied to the artery above.

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## DERMATOLOGY.

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UNDER THE CHARGE OF

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### A PERNICIOUS DISEASE OF THE SKIN NOT PREVIOUSLY OBSERVED.

SPIEGLER reports (*Archiv für Dermatologie und Syphilis*, Band xxxiii. Heft 1 u. 2) a fatal case of skin-disease which was unlike any of the known forms. The patient was a well-nourished, powerfully built man, thirty-eight years of age, who had never had any illness except an attack of syphilis eighteen years previously. Suddenly, without any demonstrable prodromes, he became ill with high fever and an erythematous eruption over the general surface. Upon this erythematous eruption, and in places upon the sound skin, serous and hemorrhagic bullæ appeared, the bottoms of which became necrotic. The process continued with high fever, and ended fatally at the end of three weeks. A bacteriological examination of the serous bullæ demonstrated the presence of an abundance of small rods, about one-third  $\mu$  long. Morphologically this bacterium could not be identified; and inoculations upon rabbits, guinea-pigs, and mice resulted negatively. Efforts to cultivate this bacterium from the blood were not successful.

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### A PECULIAR AFFECTION OF THE HAND AND ARM FOLLOWING ZOSTER.

At a meeting of the Dermatological Society of London, held October 29, 1895 (*British Journal of Dermatology*, November, 1895), DR. CAVAFY exhibited a man, seventy-eight years of age, who came under observation some four months previously with a dorso-brachial zoster of the left side. The zoster had been of exceptional severity, characteristic groups of vesicles occurring in the left interscapular region, a few over the pectoral muscle, and a large number on the inner side of the arm and forearm, there being groups on the flexor and extensor aspects of the forearm, especially near the wrist, and several large vesicles were present upon the palmar aspect of the hand and

fingers. The skin was much reddened about the vesicles, and the hand, wrist, and lower third of the forearm were much swollen; pain had been severe before the eruption for a day or two, and continued so throughout the attack. The vesicles became purulent, and were very slow in healing, one or two small ulcers being left. The subsidence of the eruption was followed by much desquamation, the skin of the palm being detached in large flakes.

At the time of the presentation of the patient the pain in the shoulder, arm, and forearm was severe. Dull-red maculæ were present at the site of the eruption, and there were two or three small scars on the forearm and near the elbow. The wrist and hand were much swollen and pitted on pressure. The fingers were in a permanent position of hyperextension, the patient being unable to flex them, and any forcible attempt to do so caused great pain. The wrist was also extended and could not be flexed. The movements of the shoulder were very weak and imperfect, but the exhibitor regarded this as due to pain rather than paralysis. Sensation was also much impaired.

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#### THE TREATMENT OF BURNS OF THE FIRST AND SECOND DEGREES WITH ICHTHYOL.

LEISTIKOW, having employed this remedy during the last six years (*Monatshefte für Praktische Dermatologie*, No. 9, Bd. xxi.), regards it as one of the very best at our command. It is especially useful because of the extraordinary manner in which it allays the pain, which is always so prominent a symptom in burns. Under the application of ichthyol slight, superficial burns heal rapidly. In burns of the second degree with the formation of bullæ, even when extensive areas are involved, the remedy acts in the most favorable manner. After the first application the œdema disappears, the hyperæmia diminishes, and the regeneration of the epithelium begins at once. Cornification proceeds more rapidly under the use of this remedy than under any other.

The manner of the application is especially important. The author has employed various forms, but has found especially useful powder, a soft paste, and a salve-mull. The powder-form is chiefly useful in extensive burns of the first degree, and should be plentifully applied. In extensive burns of the second degree the soft paste is preferable; and when the inflammatory symptoms are severe its use may be combined advantageously with that of the powder.

As a powder the author recommends the following: Zinci oxid., 20 parts; magnes. carb., 10 parts; ichthyol, 1 to 2 parts.

As a paste he employs the following: Calcei carbonat., 10 parts; zinci oxid., 5 parts; ol., 10 parts; aq. calcis, 10 parts; ichthyol, 1 to 3 parts.

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#### A UNIQUE CASE OF AGMINATE FOLLICULITIS OF PARASITIC ORIGIN.

HARTZELL reports (*Journal of Cutaneous and Genito-urinary Diseases*, November, 1895) an unusual case of folliculitis due to the invasion of the follicles by the trichophyton fungus. The patient was a man, thirty-eight years of age, in the employ of a railroad company as a repairer of signals and



switches. Some five or six weeks before coming under observation he had noticed a few small pustules on the inner side of the left leg just above the internal malleolus. Through the implication of adjacent follicles these rapidly grew into a palm-sized patch, elevated an eighth of an inch above the surrounding healthy parts. Other patches of a similar kind appeared upon various parts of the leg, and these continued to enlarge until they covered at least two-thirds of the surface of the leg. Marked pain attended the eruption, so that the patient was compelled to give up his work for a considerable time, being unable to walk. Microscopical examination of excised portions showed marked inflammatory changes in and about the follicles, and, what was most interesting, an abundance of spores and mycelium, the latter being especially plentiful.

Under the use of a sulphur ointment, one drachm to the ounce, improvement was immediate, and a cure followed within a few weeks.

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#### ACNE SCROFULOSORUM IN INFANTS.

Under this title T. COLCOTT FOX calls attention (*British Journal of Dermatology*, November, 1895) to a somewhat uncommon eruption occurring in infants, and reports a number of cases. The eruption is an indolent, small, papulo-pustular, or acneiform one, scattered about sparsely, without any attempt at grouping and without marked subjective symptom. The limbs are the parts particularly affected, the external surfaces especially, and it occurs most abundantly upon the lower extremities, the buttocks, and the parts immediately above. The papules are seated about the hair-follicles, and are acuminate in the early stages. A small pustule forms upon the top of the papule, which dries up and often shells out with a central follicular plug, leaving a crater. As they undergo involution the papules become flattened and irregular in outline, like lichen planus, and they leave stains and faint scars.

At first the author was inclined to regard the eruption as of syphilitic nature, but syphilitic treatment was without benefit. At present he looks upon it as scrofulous, and administers cod-liver oil and iron. Under this treatment the eruption disappears.

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#### THE TREATMENT OF SYCOSIS.

In a communication made to the Société Médico-Chirurgicale de Saint Petersbourg (quoted in the *Journal des Maladies Cutanées et Syphilitique*, 1895, No. 8) M. TILÉ recommends a mode of treatment for sycosis which he found efficacious in his own case after the ordinary methods had failed. Contrary to the generally received opinion, M. Tilé does not believe that shaving or epilation is necessary, but that, apart from the pain caused by these operations, they cause inflammation of the hair-follicles and inoculate sound parts. Keeping the hair cut short, so that applications may be readily made, is all that is needed. As a local application a 1 per cent. solution of corrosive sublimate in 95 per cent. alcohol is the most useful. First the sound parts are bathed with this solution, then the diseased parts, and finally both sound and diseased areas. This is practised, at first, two or three times a day, then once a day, and after a time every second day. At night, to

allay the irritation which the applications produce, Hebra's ointment is applied. With this treatment a cure may be obtained in a few weeks to two months. Treatment, however, should not be suspended until a month and a half have elapsed without relapse.

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#### FOLLICULITIS (SYCOSIS) NUCHÆ SCLEROTISANS.

Under this title EHRMANN reports (*Archiv für Dermatologie und Syphilis*, Band xxxii. Heft 3) two cases of a peculiar affection of the nape of the neck which, while resembling the dermatitis papillaris capillitii of Kaposi, yet differs from this affection in a number of its features. In the first case reported the disease began with a furuncle on the nucha; soon after the healing of this numerous suppurating points appeared over the entire nape, which in the course of a few years led to the formation of a painful swelling of the entire nucha. At the time of coming under Ehrmann's observation the nape of the neck from the posterior border of one sterno-cleido-mastoideus to the other was dark-red, swollen, the epidermis in consequence of the tension to which it was subjected, was shining, and the resistance of the part was such as to recall a cancer *en cuirasse*. The upper margin of the patch was marked by an indented line, which ran from one mastoid process to the other, and which separated the sound from the normal parts pretty sharply, the area of disease being slightly elevated above the surrounding healthy parts. A number of suppurating points were scattered about over this patch, from which slight pressure caused drops of pus to exude. Upon attentive examination it was seen that these drops of pus proceeded from preformed openings, out of which firmly fixed tufts of hair projected. A fine sound could be passed into these openings to a depth of one to one and a half cm. Further examination showed that the hair-pockets of each bundle of hair opened into a common canal through which the hairs passed to the exterior. Upon inspection of the normal scalp it was learned that the greater portion of the hair was arranged in groups, each one of which came out of a common infundibulum. A cure was obtained in this case by the electrolytic destruction of the diseased hair-follicles. In the second case the disease covered a much smaller area, and was situated just beneath the right mastoid process; its clinical features were, however, similar to the first one, and there was the same tufted arrangement of the hair.

The bacteriological examination of the pus showed the presence of staphylococcus pyogenes albus and aureus. The microscopical examination showed that the hair-infundibulum led to a wide tubular cavity lined with epidermis, into which several hair-follicles opened in such a manner that one or two of them might be regarded as a continuation of the cavity, while the others converged from the sides toward its axis, an arrangement known to exist normally in certain animals.

The author would define these cases as a folliculitis (of the hair-follicles) or a sycosis produced by staphylococci, which led to a deeply penetrating sclerosing inflammation of the skin of the nucha, because the hair-follicles, on account of their anatomical arrangement, led deeply into the subcutaneous connective tissue.

## OBSTETRICS.

UNDER THE CHARGE OF

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## RUPTURE OF THE UTERUS. RECOVERY.

In the *Centralblatt für Gynäkologie*, 1895, No. 51, QUEISNER reports the case of a multipara, aged thirty-eight years, to whom he was called by a midwife because labor-pains had suddenly ceased. The patient had complained of severe pain in the abdomen, and had become unconscious. Upon examination the head of the child was found at the brim of the pelvis, and the breech upon the left side and above. The cervix was found fully dilated, and upon the left side of the fundus a rent in the uterus was discovered between 10 and 12 cm. long. The right leg of the child protruded through this rent, and had emerged into the peritoneal cavity through a tear in the peritoneal coat of the uterus 5 cm. long. The cord had ceased to beat. By careful manipulation the right foot was brought back into the uterine cavity. Version was easily made, and the placenta, which was situated upon the anterior wall of the uterus, was readily detached. After emptying the uterus its left half contracted well, although the right portion of the womb was not firmly contracted. The pulse could be felt at the wrist after several injections of ether. There was very little hemorrhage, and hence the uterus was not tamponed. A five-pound bag of sand was laid upon the abdomen over the womb, and fastened with a bandage. Opium was given freely. The patient recovered without fever, and upon examination at the right side of the uterus there was found a hard and sensitive cicatrix. This scar remained about the same in size, but became in a short time very much less sensitive. The cause of the rupture of the uterus in this case was not clearly ascertained. The patient was an exceedingly poor woman, and had lifted heavy weights during the day upon which she was confined.

## A CASE OF ECTOPIC AND ENTOPIC PREGNANCY, WITH DOUBLE UTERUS.

In the *Zeitschrift für Geburtshülfe und Gynäkologie*, 1895, Band xxxiii. Heft 3, WALTHER describes the case of a patient, aged thirty-five years, admitted to the clinic at Giessen complaining of colicky pain in the abdomen, with irregular discharge of blood from the uterus and cessation of menstruation for several weeks. The patient had been married twelve years, and had borne three children. Following a miscarriage at six months, she had one menstrual period, after which her monthly sickness ceased. Since this time she had the subjective signs of pregnancy with irregular bleeding and the discharge of shreds of membrane.

Upon examination the patient was ill-nourished and presented the signs of early pregnancy. Above the symphysis a resisting mass could be felt, which could be shown to be the uterus pregnant at three months. Upon the left side of the median line there was a soft cystic tumor the size of a fist, which gave also resistance upon pressure. In the right vaginal vault pulsation could be felt, while examination with the speculum showed the cervix softened and the tissue colored a bluish-red. Examination under anæsthesia confirmed the diagnosis; the introduction of a sound showed that it passed up upon the left side for a length of  $9\frac{1}{2}$  cm. The physical examination of the case pointed to the presence of a tubal pregnancy upon the left side three months advanced, and also pregnancy in the right half of an ill-developed uterus. Following the examination under anæsthesia, the patient was taken with severe pains of colicky nature, with straining in the region of the bowel, her symptoms demanding abdominal section. Upon opening the abdomen a double uterus was found, and in its right portion a pregnancy three months advanced. In the left tube there was a hæmatoma. The left tube was ligated and removed, and the abdomen sponged free from clots. On the third day after the operation the patient was taken with sudden and severe hemorrhage from the uterus, which preceded abortion; this necessitated an examination and the rapid emptying of the uterine cavity. In the right half of the uterus were found the placenta, cord, and membranes, while upon the left side a thick deciduous membrane was present. The patient made a good recovery.

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#### VENTRO-SUSPENSION OF THE UTERUS. PREGNANCY AND TRANSVERSE POSITION OF THE FŒTUS.

MILÄNDER (*Zeitschrift für Geburtshülfe und Gynäkologie*, 1895, Band xxxiii. Heft 3) has collected a considerable number of cases in which pregnancy supervened after the operation of ventro-suspension of the uterus. He adds two cases, which are as follows: His first was that of a multipara upon whom suspension of the uterus had been performed to remedy prolapse of the anterior vaginal wall and retroflexion of the uterus. Miländer was called to the patient in labor, finding the fundus of the uterus two fingers' breadth below the umbilicus, while above the symphysis there was a thickened or scar tissue the width of a hand in the linea alba. The abdominal wall was depressed at this place. The child had been expelled, but the placenta was retained, although there was but slight hemorrhage. The placenta was readily removed by friction, and the patient made an uninterrupted recovery.

A second case was that of a multipara upon whom the operation of ventro-suspension had been made because of prolapse of the vagina and uterus. The patient had recovered well from the operation, and was admitted again to the clinic in the pregnant condition. The uterus was found two fingers' breadth above the umbilicus, the head upon the right side of the pelvis, the breech upon the left. The anterior abdominal wall was adherent to the anterior wall of the uterus at the site of the former suture. By palpating the round ligaments, it was possible for the physician to determine that it was not the fundus of the uterus which was found two fingers' breadth above the umbilicus, but that it was the posterior wall of the uterus which was greatly dis-



tended, while the fundus itself was lying two fingers' breadth beneath the umbilicus. The heart-sounds were heard in the median line. The vulva was swollen, while the cervix was drawn strongly backward against the promontory of the sacrum, the external os admitting two fingers. The membranes had ruptured, and the scapula, arm, and a loop of the umbilical cord could be felt. As dilatation was slow and pains were weak, De Ribes's bag was introduced, but was only partially successful. Under narcosis it was possible to dilate the os and to make version and extraction. The child was asphyxiated, but readily revived. There was a tear of the pelvic floor, which was easily united.

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#### VAGINAL CÆLIOTOMY FOR TUBAL PREGNANCY.

DONALD (*British Medical Journal*, 1896, No. 1828) reports the case of a patient married five years who had not been pregnant previously. Her last period was followed by six weeks' cessation of menstruation, and then by two weeks' metrorrhagia, when the patient was admitted to the hospital. Upon examination the uterus was found anteverted and slightly enlarged. On the left side an elongated swelling was felt, freely movable and of doughy consistence. The case was diagnosticated as one of unruptured tubal pregnancy. The patient was kept in bed for eight weeks, during which time but little change occurred. It was determined to remove the tube by vaginal section. A transverse incision was made in front of the cervix, and the bladder separated from the uterus and broad ligaments. The tube was found much distended, but fairly movable. It was incised and a large quantity of fluid blood and a tubal mole were evacuated. The collapsed tube was then ligated and removed. The wound in the vaginal vault was stitched up with catgut, the fundus of the uterus being drawn down and fixed to the vaginal wall. The patient made an uninterrupted recovery.

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#### THE PRACTICE OF SYMPHYSEOTOMY AT THE BAUDELLOCQUE CLINIC OF PARIS DURING THE YEAR 1895.

In the *Annales de Gynécologie*, January, 1896, PINARD reports twenty symphyseotomies performed during the year 1895 at the Baudellocque clinic of Paris. Twelve of these were made upon primiparæ and eight upon multiparæ. Eighteen of the cases had rhachitic pelves, one had a kypho-scoliotic pelvis, and one had a Naegele's pelvis. Symphyseotomy was performed a second time upon three patients. Fourteen of the cases were delivered with forceps after the pubic joint had been opened; in three cases version was performed because forceps had failed, and in three cases version was selected as a method of delivery. Seventeen of the women recovered and seventeen of the children. Three mothers and three children perished. In reviewing the cases of the three mothers who perished, one died of pneumonia, an examination of the pubes showing that the wound had healed and that the tissues were free from bacteria. In the second case the wound had healed by first intention. In the case of the third woman to die, the membranes had been ruptured twelve hours before, and a greenish liquid had been discharged. The section of the symphysis was readily made, but the extraction of the child was very difficult.

In the four years, 1892-1895 inclusive, 69 cases of contracted pelvis are reported. Symphyseotomy was practised extensively in these cases. Sixty-two of the patients recovered, and 61 of the children survived. In some of these cases the vagina was wounded at the time of delivery, but was immediately closed by suture. In all of them satisfactory union at the symphysis occurred.

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#### THE PREVENTION OF PUERPERAL SEPTIC INFECTION IN PRIVATE PRACTICE

HERMAN (*British Medical Journal*, 1893, No. 1828) considers bichloride of mercury the best antiseptic for obstetric practice. He draws attention to careful cleansing of the hands, sterilization of all instruments by heat and boiling, and the importance of thoroughly clean clothing. Internal examinations should be as infrequent as possible. The external parts should be thoroughly washed. As a lubricant for the finger, bichloride of mercury in glycerin 1 : 2000 is recommended. Healthy women do not require preliminary douches. Immediately after labor the physician should give a douche of bichloride of mercury 1 : 2000. If a hand or instrument has been introduced within the uterus, it should also be cleansed. If labor has been difficult, so that necrosis of the tissues is feared, a douche of bichloride of mercury 1 : 4000 should be continued twice daily. It is important that explicit directions be given to nurses, and this is best accomplished by printed rules giving careful details for their conduct.

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#### SOME UNUSUAL CASES OF HYDATID MOLE.

In the *Practitioner*, 1896, No. 1, CHAMPNEYS reports the case of a multipara, aged forty years, who, six weeks after the last menstruation, began to have a reddish discharge, followed by pain in the pelvis. The uterus became retroverted, enlarged, and incarcerated in the pelvis. Later a hydatid mole was expelled spontaneously, followed by fever and chill. The uterus was several times scraped with the finger, removing diseased tissue, washed out antiseptically, and an iodoform-suppository inserted. This was but partially successful, the use of the curette finally becoming necessary. The patient went on to recovery, although the uterus was tender for three weeks, and involution was very slow.

His second case was that of a woman, aged thirty-three years, whose menstruation had ceased for some time, and who had headache and a general feeling of drowsiness. This was followed by a slight discharge of pale blood at intervals. She was afterward taken with violent pain in the right side, with bleeding. This continued at intervals for several days, finally ceasing. On admission to the hospital an enlarged uterus and softened cervix were found. The patient was given ether, and an effort made to dilate the cervix with a laminaria-tent. This was but partially successful, and a tampon was also employed. When this gauze was removed, it was found that the patient had expelled a hydatid mole from the uterus. She died nine days after the expulsion of the mole. Post-mortem examination showed death from septic infection. He also reports the case of a girl, aged eighteen years, who had borne a child, and who, becoming again pregnant, suffered from cramp-like

pains in the abdomen, with the discharge of pale-red fluid. On examination the cervix was found high up and far back, the tissues giving the feeling as if a soft fibroid was within the enlarged uterus. Bleeding occurred, and by examination it was possible to secure a small piece of tissue. This was found to be a portion of a hydatid mole. Ergot was given, when the patient expelled two large masses with clots. The uterus was cleansed as well as possible, and douched with an antiseptic fluid. The patient had fever, and it was necessary to cleanse the uterus again with the finger, which removed a portion the size of two duck-eggs. The patient gradually improved, finally making an apparently good recovery. Some time after leaving the hospital the patient was again admitted; the uterus was curetted, the walls being found very thin. Two hours after, the patient had a violent chill, and the intrauterine douche was repeated. The patient became profoundly anæmic, and had an attack of pneumonia at the base of the right lung. It was necessary again to employ the curette, and this was followed by the use of a Keith's drainage-tube. The patient had repeated chills and finally died of septic infection.

Post-mortem appearances were those of *deciduoma malignum*.

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#### DISINFECTION OF THE FINGERS AND OF THE HAND IN OBSTETRIC WORK.

In the *Deutsche medicinische Wochenschrift*, 1895, No. 51, AHLFELD reports interesting experiments upon the best method of cleansing the fingers and the hand before making examinations and performing obstetric operations. He concludes by recommending the following: To prepare the hands for making an examination the nails should be cut short, trimmed and smoothly polished, and scrubbed for three minutes with soap and brush and warm water. The hands should then be rinsed in clean boiled water. The fingers and the rest of the hand should then be carefully rubbed in 96 per cent. alcohol with a piece of flannel. Especial care should be taken that the alcohol gets well under the nails. The fingers are then sterile for purposes of examination only.

Where the hand is to be introduced within the womb in the performance of an obstetric operation the following method of cleansing is advised: The nails to be cleaned, and the hands and arms scrubbed for five minutes with soap and hot water. The hands and arms are to be rubbed with flannel, dipped in 96 per cent. alcohol, for five minutes. The hand is then sufficiently sterile to permit the performance of any obstetric operation or manipulation.

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#### NEPHRITIS IN THE NEWLY-BORN.

In the *New York Medical Journal*, 1896, No. 3, JACOBI describes cases of this disorder in infants, and summarizes his observations as follows: Nephritis is not rare in the newly-born. The use of the centrifuge enables us to recognize cases of nephritis in infants which were formerly considered simple or transient albuminuria. The fragility of the bloodvessels, the small size of the renal capillaries, the inability of the infant's intestine to expel toxic contents, and the large size of the lymphatics and bloodvessels of the intestine all favor the absorption of toxins, resulting in nephritis. The



principal forms of this condition in infants are the congestive, resulting from feeble heart, asphyxia, and exposure; the obstructive, from rapid decomposition of the blood, with the formation of retrograde products; and the irritative, caused by infarctions of uric acid or hæmatoidin, by purpura or intestinal hemorrhage, or the microbes and toxins of enteritis and of infectious maladies.

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#### TETANUS FOLLOWING ABORTION SUCCESSFULLY TREATED BY ANTITOXIN.

WITHINGTON reports in the *Boston Medical and Surgical Journal*, 1896, No. 3, the case of a patient, aged thirty years, who had an abortion, denying positively any interference of a criminal nature with her pregnancy. Two days afterward she was seen by a physician who curetted and douched the patient, and one week later she was able to sit up. She gradually developed stiffness of the neck and lower jaw, with cramps in the legs. Her temperature varied from 100° to 102°. There was no evidence of sepsis about the abdomen or uterus. The patient gradually grew worse, with repeated attacks of spasm, with opisthotonos. Bromide and chloral were used in large quantities with no apparent result. She was able to take considerable quantities of liquid nourishment. Twenty-two cubic cm. of tetanus-antitoxin serum were injected; gradual improvement followed, she having received in all three injections upon successive days, a total quantity of 68 cubic cm. Her gradual recovery followed.

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#### THREE CASES OF SYMPHYSEOTOMY.

In the *Archives de Tocologie et de Gynécologie*, 1895, No. 12, AUVARD describes three symphyseotomies with their results. The first was the case of a multipara whose first child was lost after version, and who came to her second labor without the entrance of the child into the pelvis. The internal conjugate of the pelvis measured 9½ cm., its lateral dimensions were above the normal. The head presented by the posterior parietal bone, and flexion was absent. After the membranes ruptured, the head presented at the brim of the pelvis, but failed to engage in the pelvis. The forceps was applied, and cautious traction made for eight minutes under chloroform without success. The forceps was allowed to remain in position and symphyseotomy was performed, the joint being opened by a bistoury. The child was readily extracted, and the wound closed with silk. The patient suffered from a mild degree of septic infection, but made a good recovery.

His next patient was a girl, aged twenty years, rhachitic and having a rhachitic pelvis. The head failing to engage, the forceps was applied, followed by symphyseotomy. The child was born asphyxiated, but revived. The patient made a good recovery, and left the hospital shortly before the pubic joint became firmly fixed. She was seen subsequently, examined, and found to be in good health, with a solid symphysis.

His third case was that of a rhachitic primipara, with a much contracted pelvis, with internal conjugate of 7½ cm. Labor was induced, but failed to proceed spontaneously. The forceps was applied without result, and symphyseotomy finally done. The wound healed slowly in this case, and the child died ten days after birth, from inanition.



It will be noticed that Auvard's method of proceeding is different from that of some other operators in that he first applies forceps, and, failing to deliver, performs symphyseotomy without removing the forceps. The advantage of this method is not evident. When the head does not engage after good labor-pains, and when suprapubic pressure has been employed, efforts at delivery by forceps endanger mother and child.

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THE TREATMENT OF ECLAMPSIA, BASED UPON THE STUDY OF ONE  
HUNDRED AND TWENTY-NINE CASES.

In the *Centralblatt für Gynäkologie*, 1895, Nos. 46, 47, and 48, ZWEIFEL reports his very interesting results from his study of 129 cases of eclampsia in his clinic at Leipzig. He analyzes his cases with regard to the number and duration of the paroxysms and the degree of unconsciousness present, with reference also to the period of pregnancy at which the attack occurs, and whether eclampsia develops before labor or at the beginning of or during parturition. He has also investigated the quantity of urine, the quantity of albumin, and whether blood was present in the urine. He further has observed the quality of the pulse, its frequency and increased or diminished tension, and the temperature during the attack and during the puerperal period. He describes his former view as regards treatment, which was that shared by many, namely, that instrumental delivery should be avoided if possible, because, in spite of narcosis, the irritation occasioned by such delivery increased the number of paroxysms. He contrasts his results in former years, when his patients were treated by the expectant method, with those obtained by rapid delivery, and finds that under the former his mortality-rate was 32 per cent., while with more active measures he has reduced the mortality to 15 per cent. He prefers chloroform as an anæsthetic agent in the treatment of these cases.

These results are especially interesting in view of a change in belief which has gradually come about in the minds of many obstetricians. Dührssen's method of incising the neck of the uterus makes delivery possible in those cases where the pelvis is not contracted or the child not excessive in size. It is safe to say that within the past year American obstetricians, seeing the largest number of cases and operating most frequently, have come to share the conclusion expressed by Zweifel.

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ECTOPIC PREGNANCY WITH DELIVERY OF A LIVING CHILD AT TERM.

REISMANN reports in the *Centralblatt für Gynäkologie*, 1896, No. 1, the following case from the clinic of TAUFFER at Budapest: The patient was pregnant for the fourth time, and had suffered, when three months advanced, from sudden syncope and pain in the abdomen, with the development of a tumor which occasioned difficulty in micturition. She also had fever, for which she entered a hospital and remained eighteen days. She grew so much better that she left as cured, and her pregnancy proceeded in an apparently normal manner. She came into labor under the care of a midwife, who summoned assistance because the fetus was in transverse presentation. Labor-pains were weak, and with little force. A diagnosis of ectopic gestation was made, and the patient sent to the hospital. On examination the

fœtus could be outlined in the abdomen, and the fœtal heart heard. By vaginal examination the uterus was found drawn upward and pressed upon by a large, solid tumor at the brim of the pelvis. As labor-pains had begun, delay could not be practised, but operation was indicated at once. On opening the abdomen the fœtus was found obliquely, the breech upon the right side, the head upon the left, between the uterus and the spinal column. Its extraction was followed by profuse hemorrhage from the partially separated placenta, which had attached itself to the peritoneum in Douglas's cul-de-sac, and to the tissues over the sacrum. It was at once loosened and removed. The membranes were adherent to the posterior wall of the uterus, and they were also separated and delivered. A portion of the fœtal sac had been composed of the right broad ligament. The vessels of the broad ligament were ligated, the uterus, tubes, and ovaries removed, and Douglas's cul-de-sac thoroughly drained by sterile gauze, which was carried into the vagina. The abdominal incision was tightly closed. It was evident that at the time when the patient suffered from pain and syncope a tubal pregnancy at the right side had burst, leaving the fœtus to develop in the abdomen. The gauze was removed through the vagina on the second day, and the stitches taken out from the abdominal incision on the seventh. The patient's recovery was delayed by thrombosis in the left leg. The child lived and flourished, although the mother was unable to nurse it. Its limbs were in peculiar positions, and on the eighth or ninth day after birth athetosis developed in the right hand, from which the child ultimately recovered. Its spastic contractures gradually disappeared.

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## GYNECOLOGY.

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UNDER THE CHARGE OF

HENRY C. COE, M.D., M.R.C.S.,  
OF NEW YORK.

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### THE CONDITION OF THE MUSCULAR TISSUE OF THE UTERUS IN CONNECTION WITH DISEASE OF THE ORGAN.

BERTELSMANN (*Archiv für Gynäkologie*, Band v. Heft 1) finds, as the result of his microscopical studies, that in cases of metritis, carcinoma, and interstitial fibro-myoma of the uterus the muscle undergoes a hyperplasia, the tissue becoming softened and stratified and the cells swollen, much as in the pregnant uterus.

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### CARDIAC DISTURBANCES AT THE PERIOD OF DEVELOPMENT IN WOMEN.

KISCH (*Berliner klin. Wochenschrift*, 1895, No. 39) notes the following phenomena in connection with the establishment of the menstrual function: 1. Palpitation and tachycardia in individuals otherwise healthy, appearing before the first menstrual discharge and persisting for some time afterward. 2.

Cardiac irregularity in chlorotic females. 3. Hypertrophy of the heart, which develops at the time of maturity, caused by the circulatory disturbance which then occurs, as well as by the rapid growth of girls and improper habits of dress.

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#### VAGINAL EXTIRPATION OF THE UTERUS FOR BILATERAL DISEASE OF THE ADNEXA.

LANDAU (*Berliner klin. Wochenschrift*, 1895, No. 38) reports 109 cases, with only a single death. In the same connection he refers to 112 cases of vaginal extirpation of the uterus for malignant disease, with 8 deaths, and 56 for uterine fibroid, with 4 deaths, three of the latter not being due to the operation. In the former class all the patients with a single exception remained well after the operation—some for years. Clamps were used in all instances when the uterus was removed. The intestine was injured five times, the bladder once, and the ureter once, but the lesions healed spontaneously or were cured by subsequent operations.

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#### FERRIPYRIN AS A HÆMOSTATIC.

SCHAEFFER (*Münchener med. Wochenschrift*, 1895, No. 53) calls attention to the great value of this drug as a local hæmostatic in gynecology, used either in the form of powder or in a concentrated watery solution (16 per cent.). Unlike chloride of iron, it is not only astringent without acting as a caustic, but also has a distinct analgesic effect. In a sterilized solution it may be applied directly to oozing surfaces during operation, or may be introduced into the uterine cavity after curettage. A one per cent. solution may be employed for vaginal injection.

In cases of inoperable carcinoma, with profuse hemorrhages and foul discharge, powdered ferripyrin is especially valuable for its local anæsthetic, as well as for its astringent, properties. It is applied directly to the sloughing surface or in gauze bags, mixed with powdered charcoal.

An aqueous solution (1 to 16 per cent.) may be injected into the bladder in cases of hæmaturia, without danger; in fact, it even relieves the accompanying tenesmus.

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#### ALEXANDER'S OPERATION.

STOCKER (*Correspondenz-Blatt für Schweizer Aerzte*, 1895, No. 24) reports thirty-seven successful cases, and states as the result of his experience that Alexander's operation is the only one which maintains the uterus in its normal position, and is to be preferred to the treatment of retro-displacement by either pessaries or massage. The latter methods, he believes, are seldom curative, beside being tedious both to the physician and to the patient.

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#### CASTRATION IN OSTEOMALACIA.

NEUMANN (*Ibid.*), from a study of his own cases and those reported by others, arrives at the conclusion that neither the medical nor the surgical treatment of osteomalacia is curative in a considerable proportion of the

number. The improvement noted after the exhibition of certain drugs (notably phosphorus) is not greater than that which follows the careful regulation of the patient's diet and hygiene. This improvement is more striking when phosphorus is administered after previous castration. The operation is indicated in nulliparæ, when the disease is progressing rapidly and resists medical treatment, though it may prove of no avail to arrest it.

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#### IRRIGATION OF THE UTERINE CAVITY.

ROESING (*Archiv für Gynäkologie*, Band xlix, Heft 2) conducted a series of novel experiments with a view to determining the extent to which the uterine cavity is reached by injections. For this purpose he employed freshly extirpated uteri, injecting colored fluids through different varieties of catheters, so that the endometrium would retain the staining.

He found that the freer the outflow the less thorough was the irrigation of the cavity. The larger the amount of fluid which was injected, the more deeply did it penetrate below the surface. Sections of the uteri showed that healthy tissue was more deeply stained than diseased. Medicaments are brought most thoroughly in contact with the endometrium when introduced on applicators, or by means of a Braun's syringe.

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#### PARA-METRITIC AND PERIMETRITIC EXUDATES.

BUSHBECK and ETTINGER (*Archiv für Gynäkologie*, Band 1, Heft 2) conclude a clinical study of this subject with these practical observations: High fever of a pyæmic type may exist for weeks, yet incision of the primary focus of infection may reveal the presence of serum only; this may contain only leucocytes, or numbers of streptococcus-chains. Exudates of stony hardness may contain small quantities of pus or serum. Until the fluid is evacuated the temperature remains elevated. This fact explains the negative, or even harmful, effects of massage in such cases.

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#### PLASTIC OPERATIONS FOR PROLAPSUS UTERI.

NIEBERGALL (*Ibid.*) gives the results of the surgical treatment of prolapsus at the Basle clinic in 110 cases. The operations usually performed were amputation of the cervix and anterior colporrhaphy according to Fehling's method, followed two weeks later by Hegar's colpo-perineorrhaphy. Fehling denudes two long ovals on either side of the median line of the anterior vaginal wall, and unites their edges with silver-wire. Seventy patients were seen or heard from, and of these fifty-seven were cured at periods varying from one to six years after operation, seven of the women having since borne children. The ultimate results were twenty per cent. better than those obtained by the ordinary operation in the anterior wall.

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#### MYCOTIC ENDOMETRITIS.

COLPE (*Centralblatt für Gynäkologie*, 1895, No. 27) reports a case of obstinate cervical endometritis which resisted the usual astringents and caustics. Finally mycotic spores were found in the secretion, when lactic and sali-



cylic acids were used locally on account of their known antibacterial effect, with prompt relief. The writer states that mycosis of the cervical canal is probably a more frequent cause of obstinate catarrh than is generally supposed.

#### THE ENDOMETRIUM DURING MENSTRUATION.

VAN MEERDERVOORT (*Inaugural Dis.*; *Centralblatt für Gynäkologie*, 1895, No. 49), from a study of uteri removed during menstruation, concludes that in consequence of vasomotor dilatation of the pelvic vessels the cervical and corporeal endometrium became intensely congested, resulting in a transudation of blood, as well as in an increased secretion of mucus. When the congestion and resulting serous infiltration are moderate, corresponding to a condition of slight capillary congestion, the menstrual flow is slight, and the reverse. The degree of the congestion depends upon the intensity of the ovarian stimulus.

#### VESICO-FIXATION VERSUS VAGINO-FIXATION.

MACKENRODT (*Ibid.*), in consequence of the unfortunate results which have followed pregnancy after vagino-fixation, has been led to abandon the operation, in spite of his having had 90 per cent. of successful cases. The uterus is retained in a position of extreme ante flexion by firm adhesions, which do not yield under the influence of pregnancy. He now opens the anterior vaginal fornix by a vertical or transverse incision, pushes up the bladder, opens the vesico-uterine fold of peritoneum, and after excising as much of this membrane as possible unites the vesical edge to the fundus uteri. The bladder is then reunited to the raw surface in the corpus uteri as low as the os internum, and the vaginal wound is closed. The advantages claimed for this method are fixation of the uterus in a normal position, obliteration of the vesico-uterine pouch, preservation of the normal relations of the bladder, the absence of subsequent vesical and uterine disturbances. The indications for the operation are retroflexion with perfect mobility of the uterus, with or without prolapsus. Ventro-fixation should be preferred if the uterus is adherent.

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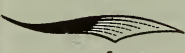
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When called to a case of influenza, the patient is usually seen when the fever is present, as the chill, which occasionally ushers in the disease, has generally passed away. Dr. Bell says he then orders that the bowels be opened freely by some saline draught, as hunyadi water or effervescing citrate of magnesia.

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less the attack is a very severe one, the above treatment is sufficient.

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PNEUMOCOCCUS-ABSCESS OF THE OVARY, WITH REPORT  
OF THREE CASES.

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SEVERAL different bacteria produce pus. They are called "pyogenic" or "pus organisms." The chief ones are the *staphylococcus aureus*, the *streptococcus pyogenes*, the *bacillus pyocyaneus*, the *bacillus pyogenes fetidus*, the *bacillus coli communis*, the *bacillus tuberculosis*, the *bacillus proteus*, the *staphylococcus epidermidis albus*, the *micrococcus lanceolatus*, or the *diplococcus pneumoniae*. The most characteristic purulent inflammations are produced by the *staphylococcus* and the *streptococcus*. The *staphylococcus* is much more likely to produce circumscribed purulent inflammations or abscesses. The majority of abscesses of the ovary are the work of the *staphylococcus*. A few ovarian abscesses contain the colon-bacillus. A few other pyogenic bacteria have been found in purulent collections in ovarian structures.

Up to date I can find no reported cases of ovarian abscesses produced by the *micrococcus lanceolatus*. It is my rare privilege to report three cases of this affection. The files of the *Index Medicus* fail to reveal a single reported case.

The *micrococcus lanceolatus* bears many synonyms, such as *diplococcus pneumoniae*, *micrococcus* of *sputum septicæmia*, *pneumococcus* of Fränkel and Weickselbaum, *streptococcus lanceolatus Pasteuri*, *diplococcus lanceo-*

*latus, meningococcus, micrococcus pneumoniae cruposa, micrococcus Pasteuri, bacillus septicus sputigenus vel salivarius.*

This organism was first discovered in 1880 by Dr. Sternberg, the Surgeon-General of the United States Army, in his saliva. The bacteriological world unites in according its discovery to this gentleman. With characteristic modesty he names it the "*Micrococcus Pasteuri*," ignoring himself utterly. The writer thinks it should bear the name "*Micrococcus Sternbergi*." The micrococcus lanceolatus ranks as the third most frequent cause of human inflammations after the pyogenic staphylococci and streptococci.

Something of interest can be said of this coccus, especially as to where it may be found and as to what it may do. It is found upon free surfaces, like mucous membranes, and in the body, as the blood and solid organs. It is found in the cellular tissue of the neck, in the mediastinum, and even in the conjunctiva. Occasionally it is found in the blood and in the juice of the spleen. It is said to pass into the foetus in pregnant women. (Viti.)

The range of inflammatory processes produced is surprisingly large. In 1886 it was shown to be the sole specific cause of lobar pneumonia by Fraenkel and Weickselbaum. This coccus is found in the exudations in the cavum tympani and ethmoidal labyrinth. It is one of the causes of osteomyelitis and periostitis. It can cause acute ulcerative endocarditis. It is found in the buccal and naso-pharyngeal cavities of healthy persons. From these localities one can easily understand how it can invade the lungs and cerebral meninges. Foa and Bordoni regard it as the sole cause of cerebro-spinal meningitis. More recent researches, however, have modified this opinion somewhat, so that at present bacteriologists affirm that a small percentage of this malady is caused by other bacteria. It is a frequent cause of broncho-pneumonia. It can produce all kinds of inflammatory exudate—serous, sero-fibrinous, and purulent. It produces inflammations in any of the mucous and serous membranes. It may cause septicaemia. It is frequently the cause of arthritis. It produces abscesses in the parotid and thyroid glands, in the kidney, and in the liver. It is the most frequent cause of meta-pneumonic pleurisies, including empyema. (Welch.)

It may be mentioned as a curious bit of chemical information that Grimbert's experiments, recently prosecuted, show that this coccus determines fermentation in glucose, saccharose, lactose, maltose, raffinose, dextrin, galactose, arabinose, mannite, dulcitol, glycerin, and starch. The products of this fermentation vary according to the nature of the sugar employed, being ethyl alcohol, acetic acid, succinic acid, and laevorotatory lactic acid. (*Proc. Paris Acad. Sciences*, November 18, 1895.)

Serum-therapy from immunized animals, employed in pneumonia in human beings, has thus far proven negative. Rabbits may be made



completely immune by repeated injections of diluted cultures of progressively increasing virulence, so that 30 c.cm. of cultures of full virulence are borne without any striking disturbance. It is a curious fact that the serum from immunized rabbits can cure pneumococcus-infection in rabbits and mice. (Emmerich.)

Thus it is seen that this organism is of the highest importance. Its range of pathological manifestations is very large. To its already widely known fields of invasion in the human body is herewith added another one, hitherto unrecorded, so far as the writer's knowledge extends.

CASE I.—I am indebted to Dr. H. B. Stehman for the privilege of examining the pus in this case :

Mrs. C., aged twenty-eight years, never strong, never had pneumonia, married six years, sterile. Became acutely ill March 23, 1894, with great pain and tenderness in the right iliac fossa; fever and vomiting. Was crippled and ill from that date till her operation, August 21, 1894, during which period of time she had lost thirty-two pounds of flesh and experienced menstrual irregularities for the first time in her life.

Examination revealed an inextricable matting together of her pelvic organs. Nothing definite beyond this condition of affairs could be satisfactorily outlined.

The operation was performed August 21, 1894. Upon opening the abdomen the right ovary was found much enlarged and attached to the omentum, intestines, and uterus. In removing the ovary the abscess contained in it was ruptured, and about four drachms of pus escaped into the peritoneal cavity. This pus was subjected to careful bacteriological examination, and the only micro-organism found was the *micrococcus lanceolatus*.

*Description of the specimen.* The surrounding adhesions were uniformly distributed over the surface of the ovary, which was occupied by a mono-celled abscess about two inches in diameter. The pus that it contained was greenish-yellow, thick, and very tenacious. The pyogenic wall was lined with a ragged, thick, yellowish, fibrinous material. No communication existed between the abscess-cavity and the lumen of the Fallopian tube, which was adherent to the ovary.

*Bacteriological examination.* Cover-slip preparations from the pus, stained with aniline water solution of gentian-violet, showed very numerous lance-shaped cocci arranged in single pairs or short chains. Preparations treated by Welch's method (glacial acetic acid, stained with aniline water solution of gentian-violet, and washed with 4 per cent. solution of sodium chloride) showed the cocci to be surrounded by well-developed capsules. They were stained by Gram's method.

*Cultures.* On faintly alkaline glycerin agar-agar (5 per cent.) at 37° C., after twenty-four hours, cultures from the pus gave a pure culture consisting of a fine white growth. There was no growth at room-temperature. Cover-slip preparations from the pus showed cocci, distinctly lance-shaped, arranged in single pairs or short chains and staining by Gram's method. No capsules in the cultures. A rabbit was inoculated subcutaneously with one-half c.cm. of the pus from the abscess. It was sick for five or six days, and then improved. On the ninth day after inoculation it was killed, and a small abscess found in the abdominal wall at

the point of the inoculation. Cover-slip preparations and cultures from the pus in the abscess gave results identical with those in connection with the ovarian abscess.

Sections of the ovary, hardened in alcohol, and stained by Gram's method, showed a few diplococci in the wall of the abscess. Sections stained with hæmatoxylin and eosin showed the wall of the abscess to consist of a dense fibrous external portion, the inner portion being densely packed with small round cells.

CASE II.—Mrs. M., aged twenty-five years, married seven years, had borne three children, of whom the youngest was eighteen months old. She had had two miscarriages, in May and November, 1894. She made a poor recovery from the miscarriage in May, and dates all of her trouble from that time. Her chief complaint was pain in the left iliac region. She was never free from it until after laparotomy. Between May, 1894, and May, 1895, she says she had two abscesses break into the rectum. She gives no history of pulmonary disease in the past.

*Examination*, May 21, 1895, showed a perfectly anchylosed uterus with a small spot of fluctuation on the left side and excessive tenderness throughout the whole pelvis.

*Operation*, May 22, 1895. The pelvis contained numberless adhesions between the omentum, intestines, uterus, tubes, ovaries, and bladder. The right ovary was cystically degenerated, right salpingitis existed, and the left ovary, as large as a pullet's egg, and containing an abscess, was ruptured.

*Description of specimen.* Ruptured adhesions existed throughout the entire periphery of the ovary. The tube was firmly bound to the ovary. Its fimbriated extremity was patent, its lumen was not dilated, but its walls were slightly thickened. The folds of its mucous membrane appeared normal. The wall beyond the mucous membrane showed only a few areas of small-cell infiltration. Upon separating it from the ovary no communication between the abscess-cavity and its lumen was detectable. The ovary contained a single-celled abscess, one and one-sixteenth of an inch thick on one side, with a firm dense, outer coat, and one-fourth inch thick on the other side, with firm, dense tissue making up most of its thickness. The inner surface was covered with soft, fibrinous exudate, which, upon removal, revealed small hemorrhagic areas scattered throughout the inner layer of the wall.

*Bacteriological examination.* Cover-slip preparations from the pus stained with aniline water solution of gentian-violet showed very numerous lance-shaped cocci arranged in single pairs and short chains of from two to four pairs. Preparations treated by Welch's method demonstrated well-developed capsules about the cocci. They stained by Gram's method. No other bacteria could be found in the cover-slip preparations.

Cultures made from the pus immediately after the operation on faintly alkaline glycerin agar-agar (5 per cent.), after twenty-four hours at 37° C. gave a growth of fine white colonies. This proved to be a pure culture of lance-shaped cocci arranged in single pairs or short chains. They stained by the aniline water solution of gentian-violet, and were also stained by Gram's method. No capsules were present in the cultures. A rabbit was inoculated subcutaneously with one-half c.cm. of a twenty-four hours' old glycerin bouillon culture. It was sick for twenty-four hours, and recovered.

In sections of the abscess-wall hardened in alcohol and stained by Weigert's method abundant fibrin was seen on the inner side of the section, with a few diplococci scattered through it. Sections stained with hæmatoxylin and eosin showed the entire wall to be very vascular, the vessels throughout being large and distended with blood. No Graafian follicles were seen. The outer two-thirds of the section consisted of mature fibrous tissue with some round-cell infiltration in areas. The inner third has the general appearance of very vascular granulation-tissue with areas of hemorrhage. It contains very numerous distended vessels. There are many hemorrhagic areas, in some the blood-cells being well preserved, in others being replaced largely by *débris* and pigment. Throughout this layer is an abundant small-cell infiltration. In a few places are seen large uninuclear polygonal cells, some of them appearing uniformly pale yellow, with faintly staining nuclei.

CASE III.—Mrs. C., aged fifty-three years, still menstruating, has complained of pain in her left iliac region since 1889. A satisfactory history of this case of ovarian abscess could not be obtained. At the time of her operation she was experiencing menstrual irregularities in the way of menorrhagias. Has not been pregnant for twenty-six years. Never had any pulmonary disease.

*Examination* revealed an immobile uterus and a mass in the left iliac region, tender and fixed, pushing the uterus over into the right side of the pelvis.

*Operation*, May 22, 1895. Upon opening the abdomen the left ovary containing an abscess was removed. A subperitoneal pedunculated fibroid as large as an English hickory-nut was removed from between the folds of the right broad ligament. Two hysterorrhaphy-stitches were used and the patient put to bed in good condition.

Her recovery was entirely satisfactory, and she left the hospital in four weeks.

*Examination of the specimen.* There were abundant general torn adhesions over the surface of the ovary and the tube. The tube was connected to the ovary by bands of adhesions, but was not intimately attached to it. Its abdominal end was patent, the tube was not dilated, contained no pus, and presented only signs of chronic catarrh. No connection between the lumen of the tube and the abscess-cavity could be made out. In the ovary was a single abscess one inch in diameter, containing two or three drachms of thick, yellow, very viscid pus. The abscess was surrounded by a wall one-fourth of an inch thick on all sides, externally being dense and fibrous, and internally presenting a lining of soft, friable material. The opposite tube and ovary were normal.

*Bacteriological examination.* Cover-slip preparations from the pus stained with aniline water gentian-violet solution showed abundant lance-shaped cocci arranged in single pairs or short chains. Preparations treated by Welch's method showed them to be surrounded by fairly well-developed capsules. They were stained by Gram's method. No other bacteria were found.

Cultures from the pus on neutral glycerin agar-agar remained sterile. Those made on Löffler's blood-serum mixture after twenty-four hours at 37° C. gave a delicate white growth, which proved to be a pure culture of cocci arranged in single pairs or short chains, staining by Gram's method. There were no capsules in the cultures. No growth occurred at room-temperature. No animal inoculations were made.



Sections of the abscess-wall, hardened in alcohol and stained by Gram's method, revealed abundant diplococci, mostly in single pairs or short chains, near the inner surface, and only a few deeper in the sections. Sections stained with hæmatoxylin and eosin were as follows: The outer two-thirds of the section were made up of irregularly arranged fibrous tissue. No Graafian follicles were seen. The inner third showed very dense infiltration with multinuclear leucocytes, with areas of marked nuclear fragmentation and some of entire necrosis. The vessels were few and not prominent, and there were no areas of hemorrhage. In the inner portion of the section were larger, unicellular polygonal cells, either single or in groups.

REMARKS. Two conditions are marked in these three cases. The first is the severe inflammatory invasion of the peritoneum as shown by the abundant adhesions. The second is in the macroscopic character of the pus, which was thick and very tenacious, resembling that seen in cases of empyema following lobar pneumonia caused by the *micrococcus lanceolatus*.

In each case the pus was literally loaded with cocci, while the sections of the abscess-walls showed only a very few. The large polygonal cells seen in the sections correspond to those represented in the drawings by Langer,<sup>8</sup> and considered by him as "luteal" cells.

Zweifel,<sup>17</sup> Frommel,<sup>15</sup> and Witte<sup>16</sup> report bacteriological examinations of 376 cases of pyosalpinx. In all of this large number of cases there were only seven instances where the *micrococcus lanceolatus* was found. In these cases there were abdominal pains, fever with chills, and nausea. In only one case (Frommel<sup>15</sup>) was there antecedent lung-affection, which was probably tubercular. In five of these cases the coccus existed in pure cultures, and in two it was associated with the staphylococcus and different bacilli. In all of them there were recent and old adhesions binding the tube to adjacent structures. The anamnesis is like that of puerperal sepsis and gonorrhœal salpingitis.

Martin<sup>3</sup> suggests a possible diagnosis of pelvic abscess from the *micrococcus lanceolatus* by excluding, in the antecedent history, labor at term or interrupted, and gonorrhœal infection, and by the evident presence of severe perimetritis. It may be added also that he cautions particularly against infecting the peritoneum and abdominal wall with such pus during the operation, because of two fatal cases reported by Frommel and Witte.

Two additional points of interest in this form of abscess arrest our attention, viz., first, the route by which the pneumococcus reached the ovary; and, second, the point of structure of the ovary, which is its primary localization. The solution of these two questions is uncertain, because they may differ in different cases.

First, the route of invasion may be by (a) the external genital passages; (b) the intestines; (c) the general circulation.

a. Weickselbaum<sup>14</sup> has observed the pneumococcus as a cause of endometritis and salpingitis. It is found in the diseased human vagina, never in the normal vagina, because it is not possible for pathogenic bacteria to exist in a normal acid vaginal secretion (Döderlein<sup>4</sup>). Thus it will be seen that in the condition of the vagina altered by local disease-processes the pneumococcus can reach the ovary from this tract by traversing the uterus and Fallopian tubes.

Poirier<sup>11</sup> has shown that the lymphatic vessels of the uterus connect with those of the tube and ovary near the ovary, thus supplying a possible route to the ovary along which infection can pass from the vagina.

b. Tubercular invasion of the tubes has been observed in women with intestinal tuberculosis (Jans<sup>7</sup>). Similarly, the pneumococcus which is almost constantly found in the human intestine (Stoecklin<sup>13</sup>) may escape from the intestine, where lesions of its mucous membrane exist, and gravitate to the pelvis, and thus reach the ovary. Illustrative of this point, Pinner<sup>10</sup> introduced dust into the peritoneal cavity of dogs and rabbits, and it soon made its appearance in the tubes, uterus, and vagina. Reaching the pelvis in this manner, at the time of the rupture of a Graafian follicle, it could easily find a favorable localization in the cortex of the ovary. Confirmatory of this fact, that the pneumococcus invades the peritoneal cavity from the intestines, Barbacci<sup>1</sup> states that he found the *micrococcus lanceolatus* in 60 per cent. of cases of perforative peritonitis, and Wilson<sup>15</sup> found it in the exudate of appendicitis. Grawitz<sup>6</sup> has shown experimentally that a considerable number of pyogenic bacteria may be introduced into the peritoneal cavity without causing peritonitis, provided the peritoneum be healthy and the wound not infected. Therefore, it can be seen that it is possible for the pneumococcus escaping from the intestine into a healthy peritoneal cavity to gravitate to the pelvis and infect an ovary presenting a suitable point of invasion, like a ruptured Graafian follicle, as the seat of primary invasion of the pyogenic bacterium, because the resultant abscess-wall contained large luteal cells and because it was lined with a yellowish, crumbling, necrotic mass of tissue. Indeed, Corvill<sup>8</sup> and Terillon have described pus-accumulations of considerable size in Graafian follicles. Reinstein<sup>17</sup> and Coe<sup>2</sup> believe that ovarian abscesses may begin as an infection of Graafian follicles.

c. The route of invasion by the circulation. Transmission of the germs of disease by this means is a well-known fact. By it any organ or tissue can be invaded. Capillary infarcts occur at any point in the capillary system, and when the circumstances are favorable the development of this secondary infection progresses in accordance with the natural history of the germs contained in the thrombic mass. An ovarian abscess, developing from this cause, will naturally be expected to have its seat in the parenchyma, and not in the cortex of the organ. There-

fore, the structure of the abscess-wall would be likely to determine whether an ovarian abscess arose from the Graafian follicle, which is seated partially within the cortex of the ovary, or from the parenchyma of this organ. If the point of infection was a Graafian follicle, the pyogenic wall would contain cells characteristic of that follicle, *i. e.*, luteal cells. If it arose from the parenchyma, there would be an absence of such cells.

In these three abscesses we find the abscess-walls containing these peculiar bodies in the second and third cases, but not in the first one. If, therefore, the premises be correct concerning the histological elements of the abscess-wall in these cases, the deduction that the first case of infection of the ovary must have been through the general circulation, and that of the second and third cases through ruptured Graafian follicles, would seem to be tenable.

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#### DIPHTHERITIC HEMIPLEGIA.

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DIPHTHERITIC paralyzes have been the subject of much research, and much has been written upon them since they were first carefully described, about the middle of the century. Although many things that are peculiar to this form of paralysis remain unexplained, and writers are still divided as to the nature of the lesions, yet since the work of Charcot and Vulpian, who, in 1862,<sup>1</sup> found granular and fatty degenerations

<sup>1</sup> Charcot Vulpian: Gazette médicale, 1863.



of the fibres of the palatine nerves, the more commonly accepted view has been that the process is essentially a peripheral one. Among those who have found lesions of the peripheral nerves besides Charcot and Vulpian are Loraine and Lepine,<sup>1</sup> who also found diseases of the nerves of the palate; Lionville,<sup>2</sup> who found the phrenic nerve affected; Schech,<sup>3</sup> of the recurrent laryngeal nerve; and P. Meyer,<sup>4</sup> who found both parenchymatous and interstitial neuritis; and in some nerves also a neuritis nodosa. Mendel<sup>5</sup> takes the same view, but also found small hemorrhagic infiltrations in various portions of the nervous system.

More or less opposed to these views are those of such men as Dejerine,<sup>6</sup> who holds that the lesions are inflammatory processes, and small hemorrhages in the spinal cord. He found<sup>7</sup> changes also in the cells of the anterior horn of the cord, which he thought comparable to those of anterior poliomyelitis. Although he found proliferation of the nuclei in the sheath of Schwann and drops of myelin, and a loss of the axis-cylinders, he considered these changes secondary. Vulpian<sup>8</sup> also found changes in the cord, but considered them of secondary importance. Kidd<sup>9</sup> ascribes diphtheritic paralyses to changes in the anterior horns of the cord. Buhl<sup>10</sup> found capillary hemorrhages in the brain, in the spinal nerve roots, and in the spinal ganglia, and also calls attention to the changes in the vessels in diphtheria.<sup>11</sup> P. Meyer<sup>12</sup> found, besides the marked peripheral changes extending to the finest end branches of the nerves, also small hemorrhages in the cord.

Oertel<sup>13</sup> found, besides degeneration of the muscles, a fact of importance in connection with thrombosis in the heart in diphtheria, also both large and small hemorrhages. Klebs<sup>14</sup> found small capillary extravasations in the pia of the cerebrum, especially upon the convexity, and occasional greater infiltrations, especially along the course of the sulci, in the ascending frontal convolution, the frontal and the temporal lobes. He also found bacteria, similar to those in the throat, in these hemorrhages. Krauss<sup>15</sup> found normal nerve-nuclei, a degeneration of the peripheral portion of the oculo-motor nerve, and a diapedesis of red corpuscles

<sup>1</sup> Article on Diphtheria in the *Nouveau dictionnaire pratique*.

<sup>2</sup> *Bulletins de la Société Anat.*, 1870.

<sup>3</sup> Schech: *Laryngologische Mittheilungen*. *Archiv für klinische Medicin*, Bd. xxiii.

<sup>4</sup> P. Meyer: *Anatomische Untersuchungen über diphtheritische Lähmungen*. *Virchow's Archiv.*, Band lxxv. p. 181.

<sup>5</sup> Mendel: *Zur Lehre von den diphtheritischen Lähmungen*. *Neurolog. Centralblatt*, 1885, p. 128.

<sup>6</sup> *Archives de Physiologie normale et pathologique*, 1878, p. 107.

<sup>7</sup> Dejerine: *Comp. rend.*, lxxxv. No. 24.

<sup>8</sup> *Maladies du système nerveux*, 1877.

<sup>9</sup> *Lancet*, Jan. 13, 1883.

<sup>10</sup> *Zeitschrift für Biologie*, 1867, p. 341.

<sup>11</sup> *Loc. cit.*, p. 359.

<sup>12</sup> *Loc. cit.*, p. 214.

<sup>13</sup> Ziemssen: *Handbuch*, ii. 2te. Auflage, 1876, p. 608 and p. 638.

<sup>14</sup> *Eulenburg's Realencyklopädie*, 1 Auflage, Bd. iv. p. 167.

<sup>15</sup> *Neurolog. Centralblatt*, 1888, p. 480.

with greater and smaller hemorrhages throughout the brain. Arnheim<sup>1</sup> found (1) hyperæmia and capillary hemorrhages in the peripheral nerves; (2) slight inflammatory processes in the muscles; (3) severe parenchymatous and interstitial degeneration of the nerve-fibres; (4) no changes in the ganglion-cells; (5) no systemic disease of the cord. Mendel<sup>2</sup> found (1) capillary hemorrhages in the central nervous system, and also in the peripheral nerves; (2) signs of interstitial and parenchymatous neuritis in the form of nuclear proliferation of the neurolemma, and alterations of the medullary sheaths. He says: "Therefore I am inclined to think that the diphtheritic poison attacks the vessel-walls as well as the neurolemma, and indeed at the same time in certain cases, and that the advocates of poliomyelitic, and neuritic changes exclusively, as the basis of the diphtheritic paralyses, may be just as far from the right as those who refer everything to thrombosis and hemorrhages—that is, to changes of the vessel-walls." Recently Bikeles<sup>3</sup> describes small black flakes in the cord, most numerous in the posterior columns (Würzelzone), to which he ascribes the ataxia. Enriquez and Hallion<sup>4</sup> found that the toxins of diphtheria injected under the skin of dogs may cause, if the dose is not too large, intense congestion of the gray matter of the cord, with hemorrhages and foci of inflammation, characterized by formative irritation of the neuroglia. J. J. Putnam<sup>5</sup> says that of the post-infection disorders of the nervous system none are so common as neuritis, and he distinguishes three varieties: (1) The neuritis attending the first stage of an infective process before there has been time for the development of general disorders of nutrition; (2) The post-infectious neuritis, in the production of which general disorders of nutrition and a variety of other causes play an important part; (3) The acute, usually fatal, and hemorrhagic neuritis of unknown origin. "Finally," he says, "it should not be forgotten that what we have considered as neuritis is often associated with nuclear and diffuse spinal lesions, and that better methods of investigation may show these to play a more important part in the production of symptoms and nerve-lesions than has hitherto been supposed." Hochhaus<sup>6</sup> thinks that the cause of diphtheritic paralysis may be situated in the muscles. Besides a slight interstitial neuritis he found always a severe inflammation of the muscles. Cramer<sup>7</sup> thinks that the changes in the nerve are

<sup>1</sup> Anatomische Untersuchungen über diph. Lähmungen. Archiv für Kinderheilkunde, Bd. xiii.

<sup>2</sup> Loc. cit., p. 133.

<sup>3</sup> Bikeles: Zur pathologischen Anatomie der post-diphtheritischen Lähmung. Arbeiten aus dem Institut für Anatomie und Physiologie des Central-nervensystems an der Wiener Universität. H. Obersteiner, Heft 2, Wien, 1891.

<sup>4</sup> Soc. de Biologie, April 14, 1894.

<sup>5</sup> J. J. Putnam: Relation of Infectious Processes to Diseases of the Nervous System. THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, March, 1895.

<sup>6</sup> Ueber diphtheritische Lähmungen. Virchow's Archiv, Bd. cxxiv. p. 2.

<sup>7</sup> Cramer: Aetiologie und pathologische Anatomie der erpheren Neuritis. Centralblatt für allg. Pathologie und path. Anatomie, Dec. 1893.

primarily vascular and interstitial. Gowers<sup>1</sup> classifies the paralyzes of diphtheria under the form of secondary toxæmic neuritis, in which the toxæmic agent first causes some definite disease, which is followed by neuritis, which is probably generally due to some chemical product of the growth of the organisms in the body. He also says:<sup>2</sup> "Diphtheria may cause acute changes in the nerve-cells and nerve-roots." He also describes the lesions found in the peripheral nerves as primarily parenchymatous, and says:<sup>3</sup> "There is not, as a rule, any inflammatory change in the interstitial tissue of the nerves, and the primitive sheath is generally unchanged." He also speaks of the "parenchymatous and interstitial inflammation and degeneration" of the muscles, and of the frequency with which small hemorrhages have been found throughout the nervous system. Pierret<sup>4</sup> found meningitis in one case, as did also Dejerine and Barth.<sup>5</sup>

Thus we see that the pathological changes produced in the nervous system by diphtheria are not confined to a single definite variety of lesion. The cases of meningitis are probably due to secondary infection of the meninges, sometimes with the Klebs-Löffler bacillus, at other times with some of the other varieties of bacteria so often associated with this bacillus in the disease. The first, however, is not at all improbable, considering the frequency with which this bacillus has been found by Wright<sup>6</sup> in the various internal organs, and in the blood from the heart, in cases dying from diphtheria. Again, certain permanent paralyzes,<sup>7</sup> occurring after diphtheria, as the rapid paralysis of one cranial nerve and the progressive ophthalmoplegias and paralyzes of other cranial nerves, are probably nuclear in origin, the result of acute or chronic nuclear changes, sometimes inflammatory, at other times due to small hemorrhages, which we have so repeatedly found mentioned among the pathological changes.

The flaccid form of the ordinary diphtheritic paralyzes, the condition of the electrical reactions in them, and the almost invariable recovery from them, all point to the lesion being one of the peripheral neuron. Whether the change is of the nature of a parenchymatous or an interstitial inflammation is harder to decide. We can, however, assume that the nutrition of the cell suffers from the presence of toxic products, probably chemical, in the blood, produced during the course of the disease, either by the micro-organism causing the disease, or by the body itself, acting under the stimulus of these micro-organisms or their products. As the axis-cylinder is but the prolongation of the nerve-cell, it is not

<sup>1</sup> Gowers: Diseases of the Nervous System. 2d ed., vol. i. p. 112.

<sup>2</sup> Loc. cit., p. 235.

<sup>4</sup> Gazette des hôpitaux, 1877, p. 13.

<sup>3</sup> Loc. cit., vol. ii. p. 913.

<sup>5</sup> Archives de physiologie, 1880.

<sup>6</sup> J. H. Wright: Studies in the Pathology of Diphtheria. Boston Medical and Surgical Journal, Oct. 4 and 11, 1894.

<sup>7</sup> See Gowers: Diseases of the Nervous System, vol. ii. p. 909.



surprising that changes are described as found in the cells of the cord at times, since the nerve-cell of the peripheral neuron in the cord may easily suffer with its process, though the changes are not those of an anterior poliomyelitis, as Dejerine thought. To be sure, certain facts are difficult to explain as resulting from a simple peripheral neuritis. Such as, for example, that the palate so often suffers alone, or that accommodation is affected without the involvement of other ocular muscles, while we should expect a toxic substance circulating in the blood to affect all nerves in approximately the same degree. To discuss these questions would take us too far from the subject of this paper, but the case of Kussmaul, quoted by Meyer,<sup>1</sup> is of sufficient interest to note here. In this case a newborn baby was attacked by diphtheria of the navel, and in consequence a paralysis of the abdominal muscles followed. This case seems to show that there is some influence from the proximity to the point of production of the poisonous substances produced during the course of the disease, perhaps upon the finer nerve-endings, which were indeed found affected in this case.

That cases of paralysis due to disease of the peripheral neuron, a peripheral neuritis, are not the only form of paralysis from diphtheria we have already seen in the case of the nuclear affections just mentioned. Besides these we find disease of the cord, and of the cord and brain combined, as in the cases of multiple sclerosis which have been reported.<sup>2</sup>

We find, in addition to these unusual forms of disease of the nervous system from diphtheria, still another form of paralysis. In the course of this disease we find a paralysis of the hemiplegic type, occurring suddenly, indicating a vascular lesion within the brain itself, caused by embolism, thrombosis, or hemorrhage. In the first cause we have to do with an embolus, carried from a clot formed in the heart, and lodging in one of the cerebral vessels. This is the direct result of the effect of the diphtheritic poison upon the muscle of the heart-wall, which has long been known and carefully studied. Leyden<sup>3</sup> found an interstitial myocarditis, and Mosler,<sup>4</sup> Oertel,<sup>5</sup> Rosenbach,<sup>6</sup> Birch-Hirschfeld,<sup>7</sup> Schemm,<sup>8</sup> and Unruh<sup>9</sup> have all described changes in the hearts of patients dying of diphtheria. Embolism from a heart-thrombus is known to occur in other marantic diseases, as typhoid fever, purpura, measles, scarlet fever, and epidemic cerebro-spinal meningitis.

<sup>1</sup> Loc. cit., p. 214.

<sup>2</sup> A. Schönfeldt: Ueber multiple Hirn-Rückenmarkssclerose nebst Angabe zweier Fälle bei Kindern nach Diphtherie. Inaug. Dissert., Berlin, 1888.

<sup>3</sup> Zeitschrift für klinische Medicin., Bd. iv. 1882.

<sup>4</sup> Archiv der Heilkunde, 1873, xiv.

<sup>5</sup> Deutsches Archiv für klinische Medicin, 1871, viii.

<sup>6</sup> Virchow's Archiv, Bd. lxx. p. 352.

<sup>7</sup> Jahresbericht der Gesellschaft für Natur. und Heilkunde, Dresden, 1879.

<sup>8</sup> Virchow's Archiv, Bd. cxxi. p. 235.

<sup>9</sup> Jahrbuch für Kinderheilkunde, Neue Folge, Bd. xx.

In the case of thrombosis in a cerebral vessel, which is not secondary to an embolus, we may have either a plugging of the vessels by bacteria in the blood-current, or the effect, direct or indirect, of the disease upon the vessel-walls, aided in most cases by the slowing of the blood-current, because of the affection of the heart.

Lastly, we have the cases of hemorrhage. The frequency with which, as we have seen, capillary hemorrhages have been found throughout the whole central nervous system points to a diapedesis of blood-corpuscles and an increased permeability of the vessel-walls, produced by the poison of the disease or by the direct action of the bacteria themselves, which we may infer both from the fact that they have been found within these small hemorrhages, and from the frequency with which they have been found in other organs of the body.<sup>1</sup> Auerbach<sup>2</sup> calls attention also to the increased blood-tension from the complicating nephritis so often occurring, as a condition favoring hemorrhage. Apolant<sup>3</sup> takes the ground that these small hemorrhages are the essential factor in the ordinary forms of paralysis from diphtheria, and that the hemiplegic form differs therefore from the other forms of paralysis quantitatively only, and not qualitatively. Certainly the hemorrhages large and small are produced directly by the poison of the disease within the body, and so should be considered as due to the disease itself. In like manner the changes in the peripheral nerves, which are the cause of the ordinary forms of diphtheritic paralysis, are produced directly by the disease, though not by the micro-organisms of the disease directly, as, indeed, in all probability, is the case with most of the symptoms of the disease. Therefore we are justified in speaking of diphtheritic paralysis and also of diphtheritic hemiplegia, as the element of time in the sequence of direct results of the disease, which constitutes the chief distinction in this case, is of minor importance.

Thus while the lesion producing these hemiplegias is the same as that in adult hemiplegias, yet they are so directly the result of the disease that it seems to me to be better to emphasize this difference by the use of a distinctive name. One writer, in reporting a case of this kind, calls it a cerebral palsy of childhood following diphtheria, although he does not discuss the pathological basis of the hemiplegia. I must dissent most decidedly from the use of such a name, because of the confusion which would result if such a designation should come into general use. In the large majority of the cases of the spastic cerebral hemiplegia of childhood we find the lesion in the cortex, most of them probably due to a meningeal hemorrhage, or an inflammatory process of the cortex, resulting in sclerosis, or the condition termed porencepha-

<sup>1</sup> Wright: loc. cit.

<sup>2</sup> Deutsche medicinische Wochenschrift, 1892, xviii. p. 168.

<sup>3</sup> Hemiplegie nach Diphtheritis. Inaug. Dissert., Berlin, 1894.

litis by Strümpell, and thus differing most decidedly from the cases we are now considering, which are usually due to a lesion of the internal capsule, except, perhaps, in the remarkable case of Gnauck,<sup>1</sup> where there undoubtedly existed a cerebral lesion of uncertain location, but very probably in the basal ganglia, indirectly involving the pyramidal fibres in the internal capsule for a time only.

Cases of diphtheritic hemiplegia are rare, and most of the text-books upon nervous diseases, as well as those upon children's diseases and general medicine, are entirely silent upon the subject. Gowers<sup>2</sup> says: "In the course of this (diphtheria), as in most other acute specific diseases, sudden hemiplegia may indicate the occurrence of a vascular lesion of the brain, either thrombosis, embolism, or a hemorrhage. Death may result. The paralysis is often permanent." Von Ziemssen<sup>3</sup> says: "Nevertheless rare exceptional cases do occur, which offer difficulties in diagnosis, such as those which arise after slight preceding symptoms, with hemiplegias and monoplegias, ushered in by apoplectic attacks. Such cases are, however, in contradistinction to the typical picture of diphtheritic paralysis, the greatest rarities, and will scarcely come to the observation of even very experienced physicians." Henoch<sup>4</sup> mentions three cases in which he saw hemiplegia come on after diphtheria. One case ended in death, where the autopsy showed embolism of the artery of the fossa of Sylvius. Prof. Bókai, of the Stephanie Kinderhospital in Buda-Pest,<sup>5</sup> says that in this hospital since 1874 he has seen four cases of post-diphtheritic hemiplegia. Hirt,<sup>6</sup> in speaking of cerebral hemorrhage, says: "Exceptionally hemiplegia occurs after diphtheria, sometimes in conjunction with a paralysis of the palate, sometimes independently." Dillon Brown<sup>7</sup> says: "The paralysis of diphtheria may be divided into two classes: first, a true multiple neuritis, and, second, other types of paralysis as a result of hemorrhages or degenerative changes in the brain or spinal cord." Bernhardt<sup>8</sup> says that cerebral hemiplegia after diphtheria is very rare. Monti<sup>9</sup> says: "Generally the diphtheritic paralysis is symmetrical, only exceptionally does one observe the hemiplegic form." Eichhorst<sup>10</sup> says that rarely there occur in diphtheria hemiplegias of cerebral character, and that they are sometimes accompanied by aphasic disturbances. Sanné says:<sup>11</sup> "The paralysis is ordinarily symmetrical.

<sup>1</sup> Centralblatt für Nervenheilkunde, 1891, p. 343.

<sup>2</sup> Loc. cit., vol. ii. p. 909.

<sup>3</sup> Klinische Vorträge. 6. Vortrag. iv. Nervensystem, 1. Ueber diphtheritische Lähmungen und deren Behandlung, p. 22.

<sup>4</sup> Vorlesungen über Kinderkrankheiten, 6te. Auflage, pp. 742, 751, 764.

<sup>5</sup> Orvosi Hetilap. No 24, quoted by Donath; Neurolog. Centralblatt, 1893, xii. p. 481.

<sup>6</sup> Diseases of the Nervous System. English translation of Hoch and Smith. Appleton, 1893, p. 219.

<sup>7</sup> In Louis Starr's American Text-Book of the Diseases of Children, 1893, p. 182.

<sup>8</sup> Berliner klinische Wochenschrift, 1886, p. 538.

<sup>9</sup> Eulenburg's Realencyclopädie, 2te. Auflage, Bd. v. p. 407.

<sup>10</sup> Handbuch der speciellen Pathologie und Therapie, 4te. Auflage, Bd. iv. p. 671.

<sup>11</sup> Traité de la diphthérie, Paris, 1877, p. 157.



It assumes very rarely the hemiplegic form. I have, for my part, met one case of right hemiplegia." Mendel<sup>1</sup> says that he has seen three cases. Wallenberg,<sup>2</sup> in 160 cases of hemiplegia, found 9 after measles, 13 after scarlet fever, and 6 after epidemic cerebro-spinal meningitis. Of Osler's 120 cases none followed diphtheria.

The reported cases of diphtheritic hemiplegia which I have been able to collect from the literature are twenty-eight in number.

Duchenne<sup>3</sup> mentions a case of diphtheria in which paralysis of the palate followed, where there came on suddenly in the middle of the convalescence, a diplegia lasting one hour, and thereafter a complete left-sided hemiplegia.

Henoch, at the Gesellschaft der Charite-Aertze in Berlin, at the meeting of February 11, 1886,<sup>4</sup> described one case which he had seen in a nine-and-one-half-year-old girl, who was taken with diphtheria on November 21st. On November 27th she was admitted to the hospital, and tracheotomy was performed. She had considerable albuminuria, which gradually diminished, with the improvement of the general condition. On the tenth day of the disease paralysis of the palate appeared. On the sixteenth day she was very weak, with a very slow pulse (52), which was small and irregular, and she had attacks of syncope. At this time there was very little albumin in the urine. She was unable to swallow and vomited. The respiration was 68; she had dyspnoea and tracheal râles. The pulse was 120. Beginning with the twenty-fifth day the respiration improved, until on the thirty-fourth day it was normal in frequency. The albumin was gone from the urine. On the forty-first day she had a sudden attack of paralysis of the left extremities and of the left side of the face, while the tongue deviated to the left. This condition lasted ten days. Then the hemiparesis disappeared gradually, and the improvement continued rapidly. At first the movements of the extremities were plainly ataxic. This also disappeared, as did the paralysis of the palate. The knee-jerks were absent on both sides. The patient recovered completely. Henoch thought the paralysis was due to embolic thrombosis.

Henoch then mentioned another previous case, where left-sided hemiplegia appeared in a nine-year-old girl after a severe attack of diphtheria. At the autopsy there was found a complete occlusion by thrombosis of the right Sylvian artery, without alterations having as yet appeared in the structure of the brain.

Henoch mentions a third case in his *Vorlesungen über Kinderkrankheiten*.<sup>5</sup> In this case, six weeks after the beginning of the diphtheria, when the patient was feeling quite well, there came on suddenly a right hemiplegia, which was not preceded by any paralysis of the palate.

In the discussion, at the meeting of the Gesellschaft der Charite-Aerzte, which followed Henoch's report of these cases, Senator<sup>6</sup> mentioned, without giving details, that he had seen a case of well-marked left hemiparesis in a girl of fifteen years, who had had diphtheria at the age

[<sup>1</sup> Zur Lehre von den diphtheritischen Lähmungen. Neurolog. Centralblatt, 1885, p. 133.

<sup>2</sup> Quoted by Sharples, Medical News, Philadelphia, Aug. 4, 1894.

<sup>3</sup> Bull. de Thér., lxxviii. fév. 28.

<sup>4</sup> Berliner klinische Wochenschrift, 1886, p. 538.

<sup>5</sup> 7te. Auflage, p. 759.

<sup>6</sup> Berliner klinische Wochenschrift, pp. 886, 1539.

of four years. He states that the hemiparesis was cerebral, but without contractures, and with atrophy.

Sanné<sup>1</sup> says: "I have for my part met one case of right hemiplegia," but gives no details.

Prof. Bókai, of Buda-Pest,<sup>2</sup> as has been said above, has seen four cases of diphtheritic hemiplegia since the year 1874. One case was in a boy of thirteen years, who had a complete right-sided hemiplegia, with involvement of the face and aphasia. In the other three cases there was once a right-sided paralysis of the face and aphasia, while in the second and third cases there was once a paralysis of the right and once of the left extremities. Bókai ascribed these cases to embolism of the artery of the fossa of Sylvius, due to a marasmic heart-thrombus.

Hirt<sup>3</sup> says: "In a girl, aged fifteen years, under my care, hemiplegia developed fourteen days after diphtheria, without any simultaneous disturbance of consciousness, and only slight improvement was noticed after several years."

Mendel<sup>4</sup> states that he has seen three cases of hemiplegia after diphtheria, two of which died. One case lived, but remained hemiplegic, and contractures developed. In all three cases there was a hemiplegia involving the lower portion of the face, the arm, and the leg, without disturbance of sensation, twice on the right and once on the left side. It came on suddenly, without marked disturbance of consciousness. One case came to autopsy, when there was found a hemorrhage the size of a cherry-stone into the inner portion of the lenticular nucleus, which had destroyed a part of the neighboring inner capsule.

In the discussion of this paper Prof. Remak<sup>5</sup> mentioned two cases of the same affection.

One was the case of a seven-year-old girl, who had an attack of loss of consciousness, followed by right hemiplegia, with transitory aphasia. The other case was one of left-sided spastic hemiplegia in a boy of eight years.

Solbrig<sup>6</sup> reports another case. E. E., four years of age, was admitted to the hospital on May 15, 1884. She had been ill with diphtheria from the 14th of April until the 1st of May. Three weeks previous to admission she had been attacked by right-sided paralysis without loss of consciousness or convulsions. At the time of admission there was paralysis of the lower portion of the right side of the face, the head was bent to the left, and the chin turned toward the right. There was also paralysis of the right upper and right lower extremities, which could not be moved at all. There was paralysis of accommodation and of the palate. The knee-jerks were absent. There was aphasia. Sensation was not affected. On June 10th the patient could speak, and there was right convergent strabismus. On August 5th the paralysis of the face was gone. The extremities were still affected. There was paralysis of the thumb-muscles and of the right peronei. The remainder of the muscles of the right extremities were still parietic. The speech was normal. The knee-jerk was absent on both sides. The paralysis of the palate, of accommodation, and the strabismus were gone. On May 5,

<sup>1</sup> Loc. cit., p. 157.

<sup>2</sup> Loc. cit.

<sup>3</sup> Loc. cit., p. 219.

<sup>4</sup> Loc. cit.

<sup>5</sup> Berliner klinische Wochenschrift, 1885, No. 13, p. 203.

<sup>6</sup> Otto Solbrig: Ueber nervöse Störungen nach Diphtherie. Inaug. Dissert., Berlin, 1886.

1885, there was still some paralysis in the region of the facial nerve, and the uvula was drawn down to the right side. Speech was normal. Contractures had formed in the muscles of the forearm. Active motion was retained in part—almost completely in the right foot. The knee-jerk on the right was increased. There were contractures in the muscles of the right leg, so that *pes equinus* had resulted.

Bouchut<sup>1</sup> reports a case of diphtheria where suddenly, during the night, right hemiplegia came on. There was paralysis of the palate, a "congestive neuritis" in the right eye, embolism of the superior branch of the central artery, and in the left eye optic atrophy. The heart was normal. The author seems uncertain as to the cause, but certainly embolism seems the most probable one.

Another case of hemiplegia from diphtheria is reported by Jäckle.<sup>2</sup>

G. A., five and one-half years old, was taken ill in March, 1891, with diphtheria. He became free from fever on the fifth day. On the eighth day the membrane was gone. The heart and lungs were normal. On the ninth day œdema of the face was noticed, and the next day of the legs. At that time there was albumin in the urine. The patient was apathetic, and vomited at times. The speech was nasal, but there was no difficulty in swallowing. On the twelfth day the patient had clonic and tonic convulsions, which were repeated several times. There was loss of consciousness. The feces and urine were retained. The pulse was 112, and hard in character. On the fourteenth day there had been no more convulsions, and the mind was clear, but there was now paralysis of the right side of the body, and the mouth was drawn to the left. The pupils reacted slowly, but were equal. Sensation was not disturbed. There was complete aphasia. Both knee-jerks were weak. The urine and feces were retained. The urine, which was drawn by a catheter, contained much albumin, epithelial casts, and epithelium. The condition remained practically the same until the end of the fourth week. Then the urine still contained a trace of albumin. The speech was better. The knee-jerks were normal. The paralysis was still unchanged. The faradic excitability of the nerves of the right side was somewhat diminished. At the beginning of the eighth week the ataxia and Romberg's symptom were still present, yet the patient could take a few steps. In the twelfth week the gait was better, though the right leg was still dragged. The arm had not improved so rapidly, but it could then be raised to the horizontal and feebly flexed at the elbow. The hand was held clinched and flexed at the wrist. The lower extremity became gradually quite capable of doing its work again, but motion of the arm remained impaired. The corner of the mouth was drawn somewhat to the left. The speech was normal. The author concludes that the cause of the hemiplegia was a hemorrhage into the posterior limb of the inner capsule.

Auerbach<sup>3</sup> reports a case of diphtheritic hemiplegia from the hospital at Frankfort-on-the-Main.

<sup>1</sup> *Hémiplégie diphthérique droite. Cérébroscopie. Atrophie papillaire et embolie dans l'œil gauche; névrite congestive de la papille droite.* Gaz. des hôpitaux, Paris, 1869, xlii. p. 401.

<sup>2</sup> A. Jäckle: *Hemiplegia cerebialis nach Diphtheritis.* Aerztliche Mittheilungen aus und für Baden, Mai 13, 1891, 1892, xli. p. 75.

<sup>3</sup> Ueber einen Fall von *Hemiplegia cerebialis nach Diphtheria.* Deutsche medicinische Wochenschrift, 1892, xviii. p. 168.



A. B., seven years old, was taken severely ill with diphtheria. The membrane was gone on the seventh day. On the eighth day there was paralysis of the palate, with nasal speech. There was no anaesthesia of the pharynx, and no paralysis of the constrictors of the pharynx. The urine was normal. On the twelfth day the patient became apathetic and vomited. The urine was cloudy; the amount small (300 c.c.); albumin was present; and many casts were found, which were granular and epithelial. On the fourteenth day oedema of the face was noted. The urine had not changed, but there was less vomiting. The examination of the chest was negative. The paralysis of the palate continued, but the muscles of deglutition remained unaffected. On the twentieth day of the disease, and eight days after the appearance of the nephritis, there came on tonic and clonic spasms of the whole body, of ten minutes' duration. The pulse was 120, and of high tension. The temperature was normal. The patient was unconscious, and this lasted throughout the night. There was no dyspnoea or vomiting. There was almost complete anuria. The mind of the patient was somewhat affected the next day. The muscles of the eyes, including that of accommodation, were not affected. The right corner of the mouth was drawn to the right, while the left cheek and the left side of the chin were motionless. The forehead was not affected. The uvula was drawn somewhat to the right. There was complete motor paralysis of the whole of the left side of the body, while the right side was not affected. Sensation on the left side was normal. There was absence of the knee-jerk and of the abdominal reflex on both sides. There was no difficulty in the speech like aphasia. There was no incontinence of urine or feces. The urine still contained albumin. There was no vomiting. On the twenty-third day there appeared moderate ascites, double hydrothorax, and anasarca. The paralysis remained unaltered. On the twenty-fifth day the oedema and the amount of albumin in the urine had diminished, while the amount of urine had increased. On the twenty-eighth day there was no albumin and no oedema, and the reflexes were normal. The faradic excitability of the nerves of the left arm was a little diminished, otherwise there was nothing abnormal in the electrical reactions. The patient improved from the fourth week. By the beginning of the seventh week she could raise the left leg half as high from the bed as the other leg. One week later she made her first attempt at walking, on which the left leg was dragged. There was then well-marked ataxia, and Romberg's symptom was present. At the time of the patient's discharge the left leg was still dragged in walking, the strength in the left hand was markedly less than in the right, and it was easier to straighten the left arm from the flexed position than the right. The arm could not be flexed and only slightly extended. The fingers could be flexed, or spread, only slightly. There existed some disturbance of co-ordination in the left arm. There was no atrophy. In laughing the mouth was drawn to the right. The organs of sense were normal. The speech was slightly nasal. The intelligence was normal. Three weeks later there was slight atrophy in the left arm. Auerbach thought he had to do with a hemorrhage in the anterior two-thirds of the posterior limb of the inner capsule, and in connection with this an ordinary diphtheritic paralysis. He concludes that it could not have been a case of uræmic hemiplegia, as these are known to be transitory.

Prof. Edgren, of Stockholm, reports another case.<sup>1</sup>

O. L., ten years of age, was taken ill on November 15, 1890, with diphtheria. He was treated in the hospital for one month. During this time he had severe vomiting. About three weeks after the attack he suddenly fell from his seat. Whether he was unconscious or not is not known, nor whether the paralysis came on at once or not. The next day it was noticed that there was paralysis of the right side, with aphasia. The patient remembered that he had had for a short time twitching of the right arm. The patient was taken home on December 17th. He was then very weak, the right corner of the mouth was lower than the left, the right cheek and chin were motionless. The eye-muscles were normal. The right arm and leg could be moved feebly. Except for a few incomprehensible nasal sounds, speech was lost. Fluids came through the nose upon drinking. There was anæsthesia of the right side, which was also colder than the left. There was incontinence of urine and feces. The patient soon became better. At the end of January, 1891, he could walk with help. In February he was able to go out. Speech could be understood, but it remained nasal for many months. The drawing of the mouth to one side gradually lessened, the power of motion returned in the right arm, and the disturbance of the bladder and rectum disappeared. During the spring there was paresis of the accommodation, which was still present in the fall. On January 20, 1892, examination showed the patient of normal size, somewhat thin, and the muscles weak. The urine, the heart, and the lungs were normal. There was a very slight paresis of the lower portion of the right face. The soft palate and uvula moved alike on both sides. The tongue deviated to the left. The patient could walk and run. There was some stiffness of the right leg in walking, the toe was dragged a little, and the foot circumducted at each step. The right extremities were colder than the left. The right hand became blue upon hanging down. There was no atrophy. The reflexes at the elbow in the arms were equal. The knee-jerks were lively, the right more so than the left. Ankle-clonus was present on the right, and the Achilles tendon-jerk was greater on the right than on the left. The cremasteric and abdominal reflexes were equal upon the two sides. Sensation was good on both sides, except that the localizing sense was diminished upon the backs of the fingers of the right hand. The electrical sensibility and excitability were somewhat diminished on the right side, but there were no qualitative changes. At the time of discharge, on March 15th, the patient was almost entirely well. Edgren regarded this as a cerebral case, due to a hemorrhage, which probably affected the inner capsule of the left side. There was no cause for embolism.

Dr. Jones<sup>2</sup> reports a case of diphtheria in a girl, which lasted ten days, in the course of which, or after which—the author does not state the time exactly—a sudden right hemiplegia came on, with involvement of the right side of the face, and ataxic aphasia. There was no loss of consciousness. The sensation was normal. The knee-jerks were weak and equal. There was no pain. The palate was paralyzed. There were no heart-murmurs. Two days later the patient began to move the leg, and motion returned gradually, so that in six weeks she was entirely well.

<sup>1</sup> J. G. Edgren: Ueber einen Fall von halbseitiger Lähmung nach Diphtheria. Deutsche medicinische Wochenschrift, 1893, xix. p. 864.

<sup>2</sup> A. A. Jones: Medical News, Philadelphia, Oct. 22, 1892, p. 417.

Seifert<sup>1</sup> reports two cases. The first was in a girl of ten years, rather weak, not hereditarily affected, but not very well developed mentally. She had always been well. The diphtheritic membrane had disappeared on the eighth day, and there was no more fever. On the tenth day there appeared paralysis of the palate, with nasal voice, and regurgitation of food through the nose. The palate was not moved on phonation. The action of the heart was disturbed, the sounds being quite irregular in rhythm and strength, and later they became very weak and intermittent. The heart was found enlarged, by percussion, as far as to the middle of the sternum. There were no murmurs. Respiration was moderately quickened. The pulse was small, easily compressible, and intermittent. There were no symptoms of kidney-trouble, and there was no albumin in the urine. On the eleventh day the heart-weakness increased, and there were symptoms of collapse. In the following night the patient awoke suddenly with a cry, stared about her, and seemed confused. She was found to have a right hemiplegia. There were no convulsions or twitchings. The right side of the face was affected, except the upper portion. The tongue deviated to the right. The right upper and lower extremities were motionless. The abdominal reflex was absent. There was ataxic aphasia. The patient understood what was said to her, but could not speak. Later she said, "Anne, Anne," to everything. Sensation was normal. The muscles of the eyes, the pupils, and the whole left side were normal. For the next few weeks there was no change in the paralysis or in the condition of the heart. Then there developed a paralysis of deglutition and an anæsthesia of the pharynx. The patient was in great danger till the end of the sixth week. In the seventh week she could swallow better, and the general condition had improved. The power of speech returned gradually, and also motion, first in the leg and later in the arm. By the ninth week she could attempt to walk. During the following weeks motion increased, but there now appeared spasm in the muscles and increased tendon-reflexes on the right. The condition six months later was this: the right side of the face was still paretic, the tongue was protruded straight, the speech was normal, the right arm could be raised vertically, and the elbow moved freely. The hand and fingers were held flexed by contractures, and extension, abduction, and adduction of the wrist and fingers were much limited, but flexion less so. There was slight weakness in the extensors of the right lower leg. The knee-jerk was increased. No clonus. Slight spasm in the leg and more marked spasm in the arm. Sensation was normal, as it had been all along. Seifert regarded embolism as the cause of this hemiplegia, the weakness of the heart having given rise to a thrombus there, which was the cause of the embolism.

The second case which Seifert reports<sup>2</sup> was that of a girl of nine years, who was attacked severely by diphtheria. On the seventh day there was paralysis of the palate. From the fourteenth day there were nephritis, œdema of the face and legs, scanty, cloudy urine, which contained albumin, and numerous granular and epithelial casts. On the twentieth day there were severe headache, vomiting, and apathy. On the next day sudden and complete hemiplegia came on. The patient cried out

<sup>1</sup> P. Seifert: Ueber Zwei Fälle von Hemiplegie cerebialis nach Diphtherie. *Neurologisches Centralblatt*, 1893, xii. p. 113.

<sup>2</sup> Loc. cit.



several times, became completely unconscious, and this condition lasted the whole day. There were no convulsions. The tongue deviated to the right, and the right side of the face and the right upper and lower extremities were relaxed and paralyzed. The knee-jerk and the abdominal reflex on the right side were absent. There was no disturbance of sensation. The muscles of the eyes and the pupil-reactions were normal. When the patient became conscious, she was found to have complete motor aphasia. She showed by signs that she understood everything, but was unable to speak. The heart and lungs were negative. There was some headache, but no dizziness or vomiting. The condition of the kidneys improved. In the course of the next four weeks there was a return of speech, and of movement in the right leg and later in the right arm. The recovery was slow. It was five months before she was able to walk, and then the right leg was dragged. She could not stand without help. There was limitation of motion in the right shoulder and elbow-joints, and the hand and fingers could not be moved at all, but were held flexed by contractures. There was marked spasm of all the muscles of the paralyzed limbs. The tendon-reflexes were increased. On March 27, 1893, the following condition was found: There was slight weakness in the muscles supplied by the lower branches of the right facial nerve. The tongue did not deviate. Speech was normal. The right arm could be raised vertically, flexion and extension at the elbow were possible. There was only slight motion in the hand and fingers. The contractures in the fingers could be overcome only with difficulty. The right leg was dragged a little in walking, and the gait was paralytic. The right knee-jerk was increased. There was no ankle-clonus. There was a spastic condition of all the muscles of the right leg. Motion at the ankle was limited. The electrical irritability in the paralyzed limbs was slightly diminished, but not changed qualitatively. There were no trophic disturbances, and no anomalies of sensation or co-ordination. In this case Seifert concludes that since the heart was negative, the hemiplegia was due to a hemorrhage which had affected the inner capsule of the left hemisphere.

Another case has been reported by Donath.<sup>1</sup> An eight-year-old peasant boy was taken ill on November 22, 1892, with diphtheria, which lasted fourteen days. On the third day of convalescence he began to go about. There came on that night while he was asleep a complete hemiplegia, with marked involvement of the face, and aphasia, which was complete for fourteen days. The mother said that he could not speak a single word, but understood everything that was said to him. The paralysis of the face improved in three weeks, the aphasia in four weeks. When he began to speak again he was hoarse, probably from a paralysis of the vocal cords. He had no difficulty in swallowing. During the next two months there was no change. The condition on April 22, 1893, was that of a well-developed, moderately nourished, but somewhat anæmic boy, with paralysis of the lower branches of the right facial nerve, and moderately indistinct and drawling speech. The palate could be moved perfectly. The right extremities, especially the upper extremity, were parietic. The upper extremity was held flexed by moderate contractures. The body was held leaning toward the right. The right

<sup>1</sup> J. Donath: Ein Fall von diphtheritische Hemiplegie. *Neurologisches Centralblatt*, 1893, xii. p. 481.

leg was dragged in walking. The right triceps and patellar tendon reflexes were much increased, and there was also ankle-clonus. On the left side all was normal. The sensations of touch and pain were tolerably prompt on the right, but somewhat less plain than on the left. The right upper extremity was slightly diminished in volume, the right lower extremity less so. There was nothing remarkable about the electrical reactions. There was no paralysis of accommodation. The right eye had 7.0 D. of hypermetropia, and there was convergent strabismus. In the left eye there was slight myopia. On May 18th the speech was still indistinct. The face was nearly normal. The extremities were more useful. The arm could be raised and stretched out. The patient could run moderately well. Donath concludes that since five months had elapsed and contractions had formed, the paralysis was due to hemorrhage.

Sharples<sup>1</sup> reports another case in a boy of thirteen years. There were cases of diphtheria and erysipelas in the house, and the boy had diphtheria. Before the membrane was gone the heart became very rapid and irregular. At midnight, December 4, 1893, he became suddenly paralyzed on the right side. There were no convulsions. He cried out several times during the evening preceding the attack. Twenty-four hours later there were tremors on the right side which shook the whole body. The skin was extremely hypersensitive. The tendon-reflexes were absent. There was aphasia. The heart was irregular and weak, but there were no murmurs. The urine was scanty, but it is not mentioned whether albumin was present or not. Four months later the gait was hemiplegic. Motion was better, but there was paresis on the right side. There was no athetosis. The tendon-reflexes were increased, but there was no ankle-clonus. The skin-reflexes were increased. There was no reaction of degeneration in the muscles of the right side. There was moderate atrophy of the right upper and lower extremities. The aphasia was improving. Sharples thinks the hemiplegia in this case was due to embolism.

Apolant reports another case.<sup>2</sup>

G. R., thirteen and one-half years old, had had measles, chicken-pox, and scarlet fever, with nephritis. At the beginning of April, 1892, he had a severe attack of diphtheria. The mother noticed that fluids regurgitated through the nose, and that the voice was nasal. There were at this time cedema of the face and a small amount of concentrated, cloudy urine. During the night of the 15th-16th of April the patient was very restless and cried out. The next morning he was conscious, but remembered nothing about the night. The mother then noticed that the arm hung flaccid by the side, and that he walked with difficulty. The weakness of the right arm and leg is said to have increased gradually. In June he went to school again, but could not write, as he had twitching of the fingers of the right hand, and he could not see well (paralysis of accommodation?). He often fell when running. Walking was also difficult, and the right arm could not be used well. He was said to have had no disturbance of speech, except that it was nasal. The difficulty in moving the arm and leg continu-

<sup>1</sup> C. W. Sharples: Cerebral Palsy of Childhood Following Diphtheria. Medical News, Philadelphia, August 4, 1894, p. 124.

<sup>2</sup> E. Apolant: Hemiplegie nach Diphtheritis. Inaug. Dissert. Berlin, 1894.

ally increased, and sensation was also diminished on the right. On June 20, 1894, the patient came to Prof. Mendel's clinic, where it was noticed for the first time that the right lower facial muscles were paretic, and that the tongue deviated to the right. The uvula was in the middle. The pupils were equal and reacted to light. The external ocular muscles were normal. The heart was negative. There was paresis of the right arm with weakness and spasm of the muscles. No disturbance of micturition. The right leg was weaker than the left, and there was especial difficulty in moving the toes. The patellar reflex was greater on the right than on the left. Sensation was diminished over the whole right side. Examination on July 3, 1894, showed the patient to be of normal size, but poorly developed, and with small muscles and little fat. The skin and mucous membranes were pale. The heart was negative. The urine was normal and contained no albumin. The muscles of the right side of the face were more relaxed than those of the left side, and that side hung down a little more and moved less than the left side. The upper part of the face was not affected. The pupils reacted normally to light and upon accommodation. The tongue deviated slightly to the right, and the uvula was drawn slightly to the left. The left side of the soft palate moved better than the right upon phonation. The speech was normal, but gave the impression that it required more effort than normally. The right shoulder could be elevated much less than the left. The right arm hung relaxed, the elbows slightly bent, the hand midway between pronation and supination, the fingers straight. The arm could be raised almost to the vertical, but less easily than the left. Passive motion in the shoulder was very slightly difficult, in the elbow more so, because of a slight spastic contracture of the biceps and supinator longus muscles. The wrist-joint was freely movable, the fingers less so. Active flexion of the fingers was particularly difficult, and somewhat so were also their extension, abduction, and adduction. There was no evident atrophy of the right arm. The grasp on the right was fair, but weaker than on the left. The patient could walk well, but the gait was paretic and spastic. The right leg, which was moreover plainly atrophied in the thigh, was held stiffer at the knee-joint than the left, and was swung outward in walking. Motion at the hip and knee was not so easy on the right as on the left. Flexion of the right leg at the knee was plainly weaker than that of the left. The ankle-joint was freely movable. The toes, except the great toe, could hardly be moved at all. The great toe lay over the second toe. There was slight contracture of the plantar flexors, especially the flexor digitorum communis. In regard to sensation, the patient said he felt more plainly on the left than on the right. Temperature-sense, muscle-sense, and locality-sense were normal. The knee-jerks were lively, the right the greater. The abdominal and cremasteric reflexes were normal. There was no ankle-clonus. The electrical reactions showed no abnormality. There was no ataxia, and Romberg's symptom was absent. Apolant concludes that the lesion was situated in the internal capsule of the left hemisphere, but does not attempt to decide whether it was produced by a hemorrhage or an embolus.

In the Berlin Gesellschaft für Psychiatrie und Nervenkrankheiten, Gnauck<sup>1</sup> presented another case of diphtheritic hemiplegia. A nine-year-old boy in his fourth year had diphtheria severely. Fourteen days later

<sup>1</sup> Centralblatt für Nervenheilkunde, 1891, p. 343.



there was paralysis of the left side, with involvement of the left side of the mouth. After five weeks the paralysis disappeared. In the sixth week there came on a new attack, with vomiting, pain in the left side, and delirium. The condition of the patient when shown was that there were athetoid movements in the left hand. These movements also involved the toes, and the left side of the face as well. The shoulder was shrugged often. There was diminution of sensation on the left side. Gnauck thought that the patient had a central affection after diphtheria.

To these twenty-eight cases of diphtheritic hemiplegia I am able to add two cases: one seen at the Boston City Hospital in the service of Dr. Knapp, and the other seen at the Boston Children's Hospital in the service of Dr. Bullard, to both of whom I wish here to express my thanks for their kind permission to make use of the cases.

The first case was that of Miss A. J., who came to the Boston City Hospital on April 23, 1894. She was twenty years of age, and single. Her family history was good, and she herself had always been well. When she was twelve years old she had what appeared to be an attack of diphtheria, for which she was treated at home. The trouble in the throat did not last long, how long could not be determined exactly, and the patient was soon convalescent. During convalescence paralysis of the palate came on, and fluids were regurgitated through the nose on swallowing. The sight was not affected at that time. Once during the convalescence she lost consciousness, but she had no convulsions. Whether this was due to cardiac weakness, or was the effect of the lesion of the brain which produced the later trouble, it is impossible to say. Only when she was able to be about again was it noticed that she could not use the right arm and leg as before her illness. The face was not affected so far as the patient knew. For some time she could not make herself understood when talking, though she understood everything that was said to her, but this trouble gradually disappeared in time. She had no pain in the limbs or head. At no time during the illness were the feet swollen, and there were no other signs of kidney-trouble noticed. The ability to use the right arm and leg increased, but she always had a considerable amount of difficulty particularly in the use of the hand. Physical examination showed a well-developed and nourished girl, who was slightly anæmic. She limped slightly with the right leg in walking, and the toes of that foot were not lifted well, but they were not dragged, and the leg was not circumducted, nor was the gait distinctly paretic or spastic. She did not sway when standing with the eyes closed. The right arm was usually held by the side, the elbow extended, the forearm supinated, the fingers flexed, the wrist not flexed but a little abducted. The right foot showed moderate pes equinus. There was considerable spasm of the muscles of the right lower extremity, and a general paresis which was shown most clearly in the extensors of the right foot. The rigidity of the right upper extremity was less, but was present, and the right arm was distinctly weaker than the left, which was shown chiefly in the grasp, which was decidedly weaker than that of the left hand, but also in flexion of the forearm on the arm, and in pronation and supination of the forearm. The rigidity of the arm was increased upon movements of the leg, but there was no athetosis. The right thigh measured 41.5 cm., 20 cm.

above the upper border of the patella. The left thigh, at the same point, measured 44 cm. The circumference of the right calf was 30 cm. That of the left calf, 37 cm. The left arm measured 25 cm., the right the same. The left forearm was 22 cm. in circumference, and the right 23 cm. The triceps tendon reflexes in the arms were equal. The knee-jerks were equal and lively. There was no ankle-clonus. There was considerable difficulty in using the right extremities, chiefly on account of the spastic condition, less because of the paresis. There was perhaps a very slight disturbance of co-ordination in both the arm and the leg. There was no disturbance of the muscular sense nor of the sense of position. Sensation was everywhere normal. There was no paresis of the facial muscles. The tongue was protruded straight. The two sides of the soft palate moved equally on phonation. The pupils were equal, and reacted to light and with accommodation, as well as to pain, and the associated action was also normal. There was no affection of the external ocular muscles. Speech was normal. The anterior tibial group of muscles in the right leg required a strong faradic current in order to produce any reaction. The other muscles of the right side reacted normally. There were no qualitative changes in the reactions to the galvanic current. The area of cardiac dulness was not enlarged. There was a soft systolic murmur over the pulmonic area. The second pulmonic sound was not accentuated.

The second case was that of a boy, P. G., twelve years of age, who came to the Boston Children's Hospital on May 23, 1894. He was the oldest of seven children, all of whom were living and healthy. He had had measles at six years, scarlatina at seven years, and pertussis at eight years of age. In October, 1893, the patient had diphtheria. He was ill about two months in all. About two weeks after the illness began the throat had improved so that he was able to be about the house again. About this time fluids began to regurgitate through the nose, and he could not see as well as before (probably from paralysis of the accommodation). He also said that he had diplopia. In November, some three weeks after the illness first began, he awoke from sleep one night with pain in the left extremities, which was worse in the arm, and found that he could not move either left extremity, and that the face was drawn to one side. The patient said that he was unable to speak at all. This difficulty lasted for about two months, by which time he was able to speak well again. About a week after speech was recovered he began to be able to walk again. He was admitted to the Boston Children's Hospital on May 12, 1894, about seven months after he was first taken ill. At that time there was marked atrophy (?) of the muscles of the left arm. The fingers were kept flexed, and he could not extend them. He was unable to pronate the hand. There was marked weakness of the grasp on the left side, and all the movements of the muscles of the left arm were much weakened. The shoulder-muscles on the left were also much weaker than on the right. The thigh- and leg-muscles of the left side showed muscular weakness in all directions. Sensation was not much affected. The knee-jerk on the left was distinctly greater than on the right. There was no ankle-clonus. Examination on May 23, 1894, showed a well-developed and nourished boy of normal size. There was paresis of the muscles supplied by the lower portion of the left facial nerve. The upper portion was not affected, and the left eye could be closed as firmly as the right. The tongue deviated to the left. The pal-

ate moved normally on phonation, and speech was not affected. There was paresis of the left arm, which was especially marked in the extensors of the wrist. There was considerable spasm of the muscles of the left arm on passive motion, and there was also slight atrophy of these muscles. Sensation was slightly diminished in the left arm, but less so in the lower extremity. There was slight paresis of the left lower extremity. The gait was normal, and Romberg's symptom was absent. The knee-jerk on the left side was greater than upon the right, but there was no ankle-clonus. The tendon-reflexes in the left arm were increased. The pupils reacted normally to light and with accommodation. There was no paralysis of the external ocular muscles, and no diplopia. There was slight inco-ordination in the left upper extremity, but no disturbance of the muscular sense or of the sense of position. There was no inco-ordination, disturbance of the muscular sense, or of the sense of position in the corresponding lower extremity. The electrical reactions showed a diminished excitability of all the muscles of the left side to the faradic current, but no qualitative changes to the galvanic current. The heart was negative.

Both these cases were evidently due to some vascular disturbance in the brain, and undoubtedly of the internal capsule of the left hemisphere in the first case, and of the right hemisphere in the second one. It was, unfortunately, impossible in either case to get a very accurate account of the symptoms at the time of the occurrence of the hemiplegia, and so it is impossible to say definitely in either case whether it was due to hemorrhage or embolism. We can only conclude in both cases, from the existence of permanent paresis and of muscular spasm, that the vascular lesion, whatever it was, had caused a destruction of nervous structures, which was followed by a secondary degeneration. As it was impossible to learn the condition of the heart or the kidneys at the time of the attack in either case, any help which might be obtained from knowing these facts is also excluded. It is of interest to note the fact that in the second case the patient could not speak for nearly two months after the hemiplegia came on. This rests upon his own unsupported statement, and could not be confirmed, as none of the relatives were seen, but there seems to be no reason to doubt the statement, as the boy told a straightforward story in other respects. However, the occurrence of aphasia with a left hemiplegia is certainly rare, but the fact that he could not speak at all, and that regurgitation of fluids came on previously without loss of speech, would indicate that there was a real motor aphasia in this case.

Of the thirty cases given more or less fully here, we find that the probable diagnosis in seven is hemorrhage, namely, one each of Mendel, Jäckle, Auerbach, Edgren, Seifert, Donath, and Solbrig. The embolic cases are ten, those of Buchut, Seifert, Sharples, Jones, two of Hénoc'h's, and all four of Bókai's. The remainder, in which the diagnosis must remain more doubtful because of the ambiguity of the case or the too brief description, comprises one case each of Duchenne, Hénoc'h, Senator,



Hirt, Apolant, and Gnauck, and two each of Mendel and Remak, and the two added in this paper.

The attack ended in death in three cases, in two of which autopsies were made. These resulted in the finding of a thrombosis of the artery of the fissure of Sylvius in the case of Henoch, and a hemorrhage into the internal capsule in that of Mendel. Unfortunately, we have no cases in which bacteriological examinations have been made or the walls of the vessels carefully examined. In two cases, one of Henoch and one of Jones, recovery took place. In five other cases it is difficult to say whether the paralysis was permanent or not, namely, in those of Henoch, Sanné, Buchut, and the two of Remak, while that of Edgren was stated to be almost well at the time of discharge from the hospital. In the remaining nineteen cases the hemiplegia was permanent, in the sense that it caused a greater or less permanent disability.

Since this article was written, still another case of diphtheritic hemiplegia has been reported. This patient was shown by Dr. Jacobsohn at the meeting on July 8, 1895, of the Berlin Gesellschaft für Psychiatrie und Nervenkrankheiten (*Neurologisches Centralblatt*, 1895, xiv. p. 794). The eight-year-old child had had diphtheria about four months before. Five weeks after the beginning of the disease a nephritis developed, which lasted three weeks. During this time a right hemiplegia came on suddenly, without loss of consciousness or convulsions. The lower part of the face was affected as in ordinary cases of hemiplegia. The right shoulder was raised, and the right arm held pressed against the side, the upper arm generally rotated outward and drawn backward, the forearm overextended and pronated, the hand abducted toward the ulnar side, the fingers flexed, and the thumb flexed and adducted toward the index-finger. The right scapula at the upper part was nearer the median line than the left one, and it was also raised. The right arm could not be raised quite as high as the left, nor could it be held so long elevated. The right shoulder was raised less well than the left. Flexion and extension of the forearm were possible, as also pronation, while supination was very incomplete, even with the aid of the biceps. Extension of the hand and fingers was impossible. Flexion of these was normal. Flexion and adduction of the thumb was good, while extension and abduction were impossible. Sensation was normal. The knee-jerk was absent on both sides. There was no atrophy, no reaction of degeneration, and no tenderness to pressure of the peripheral nerves.

Goldscheider, in the discussion that followed, said he thought the cases of hemiplegia after diphtheria were not so rare as is generally supposed, and stated that he himself had seen several, which he had not published. This statement was modified later, Goldscheider (*Neurologisches Centralblatt*, 1895, xiv. p. 848) then stating that he had seen not several, but one case of hemiplegia after diphtheria.

## A CASE OF LANDRY'S PARALYSIS, WITH AUTOPSY.

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It is a matter of much regret to us that the clinical history of this case is meagre and imperfect and that the autopsy was incomplete; yet in spite of these drawbacks the case is one presenting features of great interest. We are aware that there is room for difference of opinion as to the diagnosis, yet the history and the clinical observations of Dr. Diller, who watched the progress of the case, to our minds, favor this diagnosis rather than any other, viewed from a clinical standpoint. If the diagnosis of Landry's paralysis be accepted the post-mortem findings must be considered as of great value as throwing light upon the obscure question of the morbid anatomy of this disease.

History of the case by Dr. Diller:

R. W., married woman, aged fifty-three years, admitted to St. Francis Hospital, Pittsburg, May 10, 1894, with loss of power in legs which had developed suddenly about ten days previously. This loss of power was not absolute, but constantly progressed, although with assistance she was able to stand as late as June 10th. One week after admission she began to lose power in the arms and control of the vesical and anal sphincters. This loss of power in arms and legs and over sphincters increased steadily and became absolute about two weeks before her death, which occurred on August 8, 1894. About a week or ten days before death bulbar symptoms developed rather rapidly, as evidenced by increasing difficulty in phonation and deglutition. Indeed, during the last few days she lived swallowing was attended with such danger that she was fed by the stomach-tube.

Mentally she seemed bright enough until after the bulbar symptoms developed, when her mind became somewhat clouded.

Pain, tactile, and heat and cold sense were, as determined by tests on several occasions, unaffected. Both knee-jerks were lost. There was some swelling of both knee-joints (probably due to old rheumatic trouble), and forced movements of them caused outcries of pain.

At the time of death there was no appreciable atrophy of any part of the muscular system. The electric reactions were normal. She developed no bedsores. No fever or pain at any time (except upon motion as noted). Death was due to respiratory failure. Clinically, the case was one of ascending motor paralysis. The successive involvement of legs, arms, and muscles of deglutition and phonation, while sensation and nutrition remained intact, indicated that the disease-process was a progressive ascending one, involving the motor apparatus of the cord and medulla and leaving uninjured the sensory and trophic apparatus.

The absence of atrophy, of pains and of knee-jerks, and the preservation of sensation seemed sufficient to throw out the diagnosis of poliomyelitis, general myelitis, amyotrophic lateral sclerosis, and multiple neuritis.

From Landry's paralysis the case differs somewhat only in two features, viz., rather slow development and long course (fourteen weeks) and the paralysis of the sphincters. Cases are on record, however, in which the sphincters were involved.

*Pathological Report and Analysis of a Case and of Literature,*  
*by Dr. Meyer.*

The spinal cord only and the anterior and posterior roots were examined. The stains used were Ehrlich-Biondi, hæmatoxylin, and Weigert-Pal. Macroscopically nothing could be seen in the cord that would have indicated disease.

FIG. 1.



Mid-cervical region.

The left side gives the relative appearance of the tracts of the cord, the right side the outlines of the degeneration in the lateral columns. Drawn with Edinger's projection apparatus; enlarged twelve times.

The sections, however, showed very plainly the following changes :

Weigert-Pal sections. In the cervical region (Fig. 1) the area of the pyramidal tracts is very distinctly outlined, decidedly lighter stained than even the anterior horns, though not so light as the gelatinous substance of the posterior horn. The direct cerebellar, antero-lateral, and posterior tracts are deeply stained; also the ground-bundles. Counter-stain with carmine demonstrates the presence of a rather large amount of "connective tissue" in the region of the pyramidal tracts; in this tissue there remain a large number of medullated fibres well stained. The uncrossed tract is not affected. The same condition is noted in the upper and lower dorsal region and in the lumbar region. (Fig. 2.)

Biondi-Ehrlich stain. Marked hyperæmia of the area of the crossed pyramidal tracts and increase of neuroglia-fibrils. (Fig. 3.) The axis-cylinder of the pyramidal fibres slightly rarefied, but nowhere in a con-



dition of decay or swelling. The process of disease is probably stationary in the cord.

Hæmatoxylin-stain shows a slight increase in the number of nuclei in the area affected.

The anterior horns are not affected so as to give evidence of disease with the hardening in Müller's fluid. Only the marked pigmentation

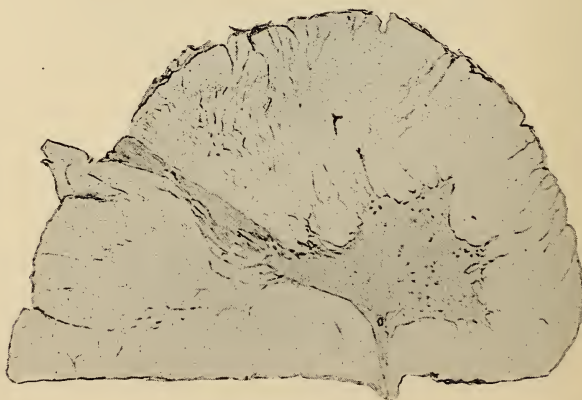
FIG. 2.



Lumbar region.

of the ganglion-cells attracts attention. The roots of the spinal nerves are free from degeneration. In the dorsal region defects can be noticed in the posterior columns. They are, however, only present in a piece of

FIG. 3.



Mid-cervical region.

Stain with Ehrlich-Biondi's color-mixture. Hyperæmia of pyramidal tract.

cord that was bent. This and the absence of reactive changes (increase of neuroglia-fibres) speak very much in favor of the view that the falling out of a number of axis-cylinders is a mere post-mortem injury.

The findings are thus limited to a partial decrease of medullated fibres

in the crossed pyramidal tracts, with secondary increase of the neuroglia-fibres, in the whole extent of the spinal cord, and excessive pigmentation of the anterior horn-cells.

The medulla oblongata and the brain, and also the peripheral nerves, were not available for examination.

A review of the cases of Landry's paralysis with autopsy was compiled by Dr. A. Cramer in 1892.<sup>1</sup> Several cases have been reported since.

A perusal of the literature up to the date mentioned shows that the clinical picture has been taken very broad, allowing quite a number of cases of plain polyneurites to be classified under the head of Landry's paralysis. Polyneuritis may be an acute ascending paralysis; but an acute ascending paralysis need not be Landry's paralysis because the disease shows first in the legs and then rises gradually to the upper segments of the body. The cardinal points for the differential diagnosis should be:

1. Flaccid paralysis of the muscle, spreading rapidly from one point over the rest of the body, generally beginning in the legs, but sometimes following the reverse order, as in the French zoölogist Cuvier.

2. Absence of muscular atrophy and of electrical reaction of degeneration.

3. Tendon and superficial reflexes absent.

4. Sensibility not, or only slightly, impaired.

5. Sphincters, as a rule, intact (exceptions rather frequent).

6. A criterion has been the absence of an anatomical lesion.

Among the twenty-seven cases with fairly satisfactory post-mortem examination, collected by Cramer, we find nine without findings, seven of which were reported before 1876. In the one of Kahler and Pick (1880) the peripheral nerves are not mentioned, although there was diminished electric reaction; the case of Strümpell (1883) is without examination of the peripheral nerves and does not contain any remarks on the electric reactions. Considering everything, there is some reason to believe that it is not pure chance that most of the cases without pathological findings date from a period when the technique was defective, and that all of them date from before the time when Weigert's hæmatoxylin method was published (1884); the case of Albu forming the only exception. (See below.)

The peripheral nerves alone were found diseased in six cases. The case of Eichhorst (1876) would now be classified clinically as polyneuritis (anæsthesia and reaction of degeneration in paralyzed parts). One case of Déjerine (1879), one of Eisenlohr (1890), might have been suspicious for polyneuritis (paræsthesia and diminished electric reaction). Among

<sup>1</sup> Dr. Cramer: Die Pathologische Anatomie der Landry'schen Paralyse. Zusammenfassendes Referat. Cbl. f. allg. Path. u. path. Anat., Bd. iii. pp. 6-21.

the three genuine cases that remain in this group, the one of Nauwerck and Barth (1889) is the most remarkable, since the patient, a girl of eighteen years, lived three months, with flaccid motor paralysis of legs, trunk, and arms, and finally died of bulbar symptoms. The sphincters were free, sensibility only slightly interfered with, electric reaction normal. Clinically the case resembles ours most of all.

In seven cases the spinal cord alone was affected. In only two of these (Eisenlohr, 1878, and Immerman, 1885) the peripheral nerves were positively pronounced intact; in the others the question remains unanswered. Baumgarten (1876) found bacteria and cell-infiltration in the cord; v. d. Velden (Leyden) disseminated myelitis, with cloudy swelling of anterior horn-cells; Eisenlohr (1878) exudates round the bloodvessels and numerous small hemorrhages; Kummel (1881) observed hemorrhages in the restiform bodies in a case of typhoid fever (fourth week), who died four days after the onset of paralysis, without disorder of the reflexes; Aufrecht (1881) had two cases with small myelitic foci. Immerman's case of six weeks' duration showed numerous granule-cells and hyaline degeneration of anterior horn-cells.

In the remaining five cases lesions of both peripheral nerves and spinal cord are reported. The earliest one dates from 1868 (G. Harley and J. Lockhart Clarke): softening in the anterior roots and in the cord; duration, six days. In the case of Schulz and Schultze (1882) reaction of degeneration and paralysis of sphincters are recorded. Decay of medullary sheaths in peripheral nerves, swelling of axis-cylinders in the cord, and cloudy swelling of motor ganglion-cells and also disintegration of the muscle-fibres were found; duration, four weeks. Hoffmann (1884) reports, in his case, swelling of axis-cylinders of anterior roots, lateral columns, pyramidal tracts, and corpora restiformia and capillary hemorrhages. Centanni's case (1889) showed invasion of peripheral nerves by bacilli and slight affection of cord without bacilli; Eisenlohr (1890) had one case with interstitial and parenchymatous neuritis and obtained three kinds of micro-organisms from the sciatic nerve and the spinal cord.

Seven autopsies of fairly typical cases have been published since, and are accessible to us in abstracts of the *Neurologisches Centralblatt*. In one of them (J. Watson, *British Medical Journal*, December 10, 1892) nothing was found but slight congestion of the membranes of the cord. It is impossible to say, from the abstract, how extensive an examination was made. The case of Pribykow (*Neurologisches Centralblatt*, 1894, p. 716) was one of polyneuritis, probably involving the spinal cord; he found numerous granules with Marchi's method, where other stains had not shown anything abnormal. The peripheral nerves were extensively affected. In the case of Albu (*Zeitschrift für klinische Medizin*, Bd. xxii.) the macroscopical and microscopical and bacteriological examinations were negative. The patient died on the fifth day.



Hun<sup>1</sup> published another typical case of twelve days' duration, with degeneration of fibres of the anterior roots of the cauda equina and thickening and infiltration of the walls of the anterior spinal vein; and Klebs ("Ueber Landry'sche Paralyse," von Prof. Klebs in Zürich, *Deutsche med. Wochenschrift*, 1891, No. 3) found in his case hyaline thrombi within the area of the central arteries of the spinal cord.

There remain the two cases of Hlava<sup>2</sup> and Eichberg.<sup>3</sup> They both showed round-cell infiltrations and small hemorrhages in the anterior horns of the spinal cord, without degeneration of the anterior roots.

Adding the findings of our own case to those mentioned above, we would sum up our view as follows:

Landry's paralysis is a symptom-complex without quite uniform post-mortem findings. There may be cases of very rapid course in which the naked eye, and even microscopical examinations with the help of older methods, does not reveal any lesion. With the improvement of the technique, these cases have become very rare, and there is reason enough to believe that the most recent technical proceedings would have demonstrated changes in most cases. Hereby one of the most important items that induced Landry to describe this symptom-group as a disease, *sui generis*, has fallen; the post-mortem findings can no longer be said to be negative, but they are at least not quite uniform.

Since polyneuritis and the forms of paralysis depending on it have been separated more closely from the so-called spinal paralysis, many cases apparently following the type of Landry's paralysis, but exhibiting sensory disturbances, electric reaction of degeneration, and perhaps the characteristic pain, spontaneous or on pressure, of neuritis, have led to the conclusion that every case was properly a polyneuritis, with or without spinal complication, but not far enough developed to give all the characteristic symptoms. This is the view of J. Ross and J. S. Bury,<sup>4</sup> who analyzed ninety-three cases of Landry's paralysis up to 1888, and claimed that it was too acute to give all the symptoms of polyneuritis, but identical with it, because it had the same etiology. Eisenlohr takes a broader view, on ground of his own cases with autopsy. He, and with him Cramer, states that either the peripheral nerves alone, or the peripheral nerves and the central nervous system, may be diseased, and that the peripheral nerves are involved in almost all cases. Clinical and anatomical evidence to this effect has been obtained in abundance.

<sup>1</sup> Henry Hun: The Pathology of Acute Ascending Landry's Paralysis. New York Medical Journal, May 20, 1891.

<sup>2</sup> Polymyielitis Acuta Disseminata Partialiter Hæmorrhagica (Paralysis Landry). Archives Bohèmes de médecine, Tome IV., fasc. 2, p. 256.

<sup>3</sup> A Case of Acute Ascending Paralysis with Rapidly Fatal Issue. Medical Record, February, 1891.

<sup>4</sup> On Peripheral Neuritis, 1892.

While this paper was going through the press a patient presenting the following features was observed by one of us (Dr. Diller): A middle-aged man, known as a steady drinker, developed loss of power in legs, besides pain and great tenderness of nerve-trunks, atrophy, loss of knee-jerks, failure of memory, and other mental symptoms. Subsequently the trunk and then the arms became involved in the same manner as the legs. Finally, bulbar symptoms developed, and death soon followed. Paralysis of vesical and anal sphincters and bed-sores (which developed to enormous size) were prominent features after the trunk and arms had become involved. Clinically this would seem to be a case of acute ascending alcoholic multiple neuritis, in which there was serious involvement of the cord.

In looking over the history of the diseases of the nervous system that do not depend on a well-localized lesion, we find several instances of similar fluctuation of explanatory hypotheses. Paretic or paralytic dementia, for instance, has been styled leptomeningo-encephalitis chronica diffusa; now we know that the process of degeneration is not limited to the pia, nor to the cerebral cortex, nor to the brain as a whole, but that there are few cases in which the spinal cord and the peripheral nerves are not affected as well. The same holds for alcoholic neuritis. In a great number of the cases there are marked central disorders, especially loss of memory, delusions, etc.; in lead-poisoning, too, we find not only affections of the peripheral nerves, but also of the spinal cord and brain; nevertheless, we find both these forms simply classified as polyneuritis, because the peripheral lesion gives the best analyzed symptoms. We find also that the old division of peripheral and spinal and cerebral disease can no longer be upheld for anatomical reasons. A peripheral motor-fibre can never be a unit, since it is merely a process of a ganglion-cell in the anterior horn of the cord or in the motor nuclei of the medulla oblongata. The motor symptoms, and also the electric reaction, are the same whether the interruption of function takes place in the anterior horn-cells or in their processes. A lesion of the ganglion-cell involves the processes, and a lesion of the processes involves the ganglion-cell; hence it is practically impossible to outline the limitation of consecutive changes even to a well-localized affection of a nerve, as, for instance, a contusion or section, and certainly much less so the area involved by a diffused process of inflammation or degeneration, and it is certainly arbitrary to call the process simply myelitis or simply polyneuritis.

While we owe most of the present accuracy of clinical neurology to the rigid attempt at localization of lesions, localization must take a broader field and begin more and more to cover the localization of function and its anatomical substrata without paying attention to accidental topographical dividing-lines, if we wish to do justice both to the recent findings and to the traditions of clinical neurology.

To Moebius (*Abriss der Lehre von den Nervenkrankheiten*, Leipzig, Amb. Abel, 1893) is due the credit of having broken the orthodox method of classifying nervous diseases according to the localization of their lesions only. A hemorrhage, an injury, a tumor, a focus of localized inflammation, must, of course, determine symptoms that are best systematically arranged according to the old system depending on localization. But for a great proportion of diseases the etiological characteristics give a very satisfactory systematic basis, and there seems to be little doubt that ultimately the general pathology of the nervous system will be much benefited by the departure.

The entire group of intoxications, either of real toxic or of microbic origin, is characterized by only relatively localized affections of the nervous system. It is true that polyneuritis is most frequently the most prominent feature of the acute forms; but very often the symptoms cannot all be explained on the basis of merely peripheral disease, and pathological anatomy proves plainly that a purely peripheral disease in the old sense is hardly possible (compare the research of Nissl, *Cbl. f. Nervenheilkunde*, July, 1894), and that indeed there are, as a rule, microscopical changes not only in the large ganglion-cells of the anterior horns, but also more diffusely in other parts of the cord. It seems in none of the cases an accurate examination of the brain has been made. Probably there would be lesions there as well.

There is probably no writer who would to-day refuse the view that Landry's paralysis and allied acute destructive processes in the nervous system are most probably of toxic origin. The nature of the toxic matter and the special disposition of the individual exposed will determine the character and extent of the symptom-complex. What are they? There are four cases on record in which bacteria were found in the cord or in the peripheral nerves, or in both. Baumgarten (1876) found characteristic bacteria in the cord. Curschmann found typhoid bacilli in the cord of a case that died during typhoid fever. Centanni (1889) described bacteria in the peripheral nerves of his case, and Eisenlohr found no less than three kinds of micro-organisms in one of his cases. On the other hand, there are quite a number of cases in which very careful bacteriological examination of all the organs was quite negative. This seems to be certain that there is not a special germ that would alone and always produce the same effect, Landry's paralysis. If one of us (Dr. D.) submits the suggestion that the micro-organism that engenders the poison is one which is harmless in the body under ordinary circumstances, but which under peculiar circumstances becomes pathogenic, and results in bringing about this disease, we must admit that the cases in which a complete bacteriological examination of the internal organs was negative still remain unexplained; on the other hand, the cases following typhoid infection and influenza will probably



be explained as caused by specific reaction to those specific infectious diseases. How far Edinger's Ersatztheorie will explain the peculiar distribution of the lesion in the individual cases remains to be shown when more attention will be paid to such questions of etiology and predisposition. His idea is that every toxic process properly is an interference with nutrition, amenable to repair within certain limits, but irreparable when the modulus of elasticity is surpassed; disorders of nutrition are most deleterious in those mechanisms that are least deeply rooted, least stable. It may satisfy many to know that in locomotor ataxia the post-syphilitic disorder of nutrition and function attacks almost exclusively the posterior columns of the cord and the posterior roots. But there arises the question: Why are certain spinal segments affected in preference to others (in cervical tabes, etc.), and why does the patient not show the symptoms of general paralysis, etc.? In a similar way we should ask, Why does the process of intoxication in our case affect largely the pyramidal tracts and perhaps the posterior columns and least the anterior roots, while other patients with the same affection have almost exclusively polyneuritis?

Our case does not give any clue in this direction as far as it could be examined. It seems to be unique, since no other report mentions a marked atrophy in the pyramidal tracts (cf., however, the case of Hoffman). There is one clinical case reported that might have an element of similarity if we would look upon it as one of a lesion within the possibilities of repair, involving the peripheral nerves, especially of the upper segments of the body (including the motor nerves of the eye), and the terminal apparatus of the central motor path (the end brushes the pyramidal tract), especially in the lumbar region. Muratow reported the case in the Society of Neurologists and Alienists at Moscow, January, 1892, as a case of acute ascending paralysis (Landry). (*Neurolog. Centralbl.*, 1892, p. 493). It is anomalous in many respects and an instance worth knowing of the polymorphous character of the disease. There was atrophic paralysis of the four extremities, the muscles of the trunk and the diaphragm, serious bulbar symptoms, and hyperæsthesia and pain in the course of the nerves, besides other purely neuritic symptoms. Moreover, there were nystagmus, dilatation of the right pupil, and exaggerated knee-jerk and ankle-clonus on both sides. The patient recovered.

If we recognize a certain uniformity in the *modus operandi* of the exciting causes of acute ascending paralysis, and if we recognize that the same cause may produce various types of disease in various individuals, we might look out for a common term for these forms, since the types are rarely pure. Oppenheim is evidently in favor of the extension of the term Landry's paralysis when he says that it had been too narrowly outlined by Landry. Eichberg (*Medical Record*, February, 1891) tries

to avoid the difficulty by calling his case one of acute progressive motor paralysis. This name is certainly too narrow, since it does not take into account the hyperæsthesia that was present in his own patient. Leyden divides the cases into neuritic and bulbar ones, according to the starting-point and the chief distribution of the degenerative process. This classification is also too one-sided. The real bulbar cases are very rare as compared to those that begin in the lumbar cord, and it would be at least safe to make a third group of principally spinal cases.

There is a group of acute general nervous affections which have common features in their etiology, their rapid onset, and their course, most probably the result of acute infectious or toxic toxæmia or of exhaustion. According to the age and predisposition of the patient and the character of the poison, fairly definite groups of functional elements are involved which allow us to recognize marked clinical pictures with corresponding anatomical conditions.

1. In early childhood the prevalent forms are acute poliomyelitis; acute encephalitis is probably not belonging here, against the view of Strümpel.

2. In the adolescent and in the adult, polyneuritis, with distinct prevalence of the peripheral nerves, and Landry's paralysis, with prevalence of spinal symptoms.

There seems to be little doubt that acute "delirium grave" forms a parallel to these affections among mental diseases. These groups are by no means rigidly separated. Thus, we know of diphtheritic acute nerve-intoxication, that it comes into the picture of polyneuritis even in children; and in the adult the acute nerve-intoxication shows various transitions from polyneuritis to the spinal form, Landry's paralysis, and even involvement of the central motor path. The prevalence of the motor symptoms is very marked.

Our means of diagnosis are insufficient at present to localize the lesion in every clinical case more than approximately. The pathological findings vary according to the duration of the disease, and certainly also according to the methods employed for the examination.

More stress should be laid in the future on the study of etiological and predisposing factors, and, if possible, more elaborate precautions should be taken in the autopsy. On ground of the present experience the pathological examination should comprehend a study of at least the chief peripheral nerves, the cord, the medulla, and the cerebral cortex (at least the motor area) with the recent rapid stains (Nissl and Rosin) and with the osmic acid and ordinary fixation (Müller's fluid). Moreover, a bacteriological examination of the parts mentioned and of the internal organs should be made.<sup>1</sup>

<sup>1</sup> The cases of Oettinger and Marinesco and Villa came to our notice since the above was written, and are in no way opposed to the views put forth.

POLYMYOSITIS ACUTA, WITH REPORT OF A CASE PRESUMABLY OF SYPHILITIC ORIGIN (MYOSITIS SYPHILITICA).<sup>1</sup>

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ACUTE inflammation of muscle may be the result of direct extension from some inflammatory focus, primary in some neighboring organ or tissue. Under this head would be classed myositis secondary to suppuration in bone, gland, joint, pleura, etc.; to actinomycotic, anthracic, gangrenous, or neoplastic foci in neighboring parts. Under this head also must be classed the periarteritis nodosa of Kussmaul.

Hæmatogenic myositis occurs in pyæmia (multiple muscle-abscess), acute rheumatism, typhoid fever, and the other acute infectious diseases (degeneratio Zenkeri). Purulent myositis from distant pyogenic focus may occur in this way.

In like manner (hæmatogenic) tuberculosis of muscles may arise, as may syphilis. And a primary, presumably hæmatogenic, as yet cryptogenic, inflammation of many muscles, known as polymyositis acuta, has recently been described. To this affection and to syphilitic myositis, both rarely met with, I desire to direct attention. As a text I present the following history:

Mrs. J. M., aged twenty-four years, native of Norway, housewife, entered the Cook County Hospital, Chicago, on November 11, 1894. From Mrs. M. herself and from Dr. S. G. West, who had treated her outside and who very kindly furnishes me some of the facts in the case, the following was learned:

The family history was negative. She began to menstruate at thirteen; menstruation had proceeded naturally and regularly, uninterrupted by pregnancies, up to date of admission to the hospital. Her habits were regular, moderate drinking of beer being the only indulgence in alcoholics. She had lived in Chicago five years. Aside from the ordinary diseases of childhood she had previously been free from illness.

To this statement of hers as to previous health, however, direct questions bearing upon possible syphilis seemed to indicate that an exception must be made. While denying any knowledge of a venereal sore, of alopecia or skin eruption, she said that about ten years before she had had a sore mouth and throat that lasted one month; and a year later small, painless swellings of the size of a bean had appeared on the anterior surface of either tibia. Motion or pressure had caused slight pain. No ulceration or discoloration of the skin accompanied or succeeded their appearance. They had gradually disappeared after five or six months. This, taken in connection with the fact that the husband admitted having been treated for syphilis, and with the general adenopathy to be described later, made the probability of syphilis almost a certainty.

Five weeks ago, about October 4th, she felt a sharp pain in the outer side of the right forearm just below the elbow. The arm at this point



became rapidly swollen and tender. Two days later the calf of the right leg was similarly affected, and three weeks later the calf of the left leg. She felt no pain or distress except in the parts affected. The appetite was good; no stomach-disturbance; the bowels regular; she slept well. Dr. West, who saw her a few days later, found a temperature of  $100^{\circ}$  to  $102^{\circ}$  F. About two inches below the external condyle of the humerus was a swelling the size of an English walnut, moderately firm, fairly well circumscribed, and apparently situated in the supinator longus muscle. The right calf was more diffusely swollen, was quite hard and painful on pressure or on attempts to move the foot. By the doctor's directions an ointment containing iodine and iodide of potassium (unguentum iodi) was used freely over the affected parts. Later the left calf was similarly affected.

*Status præsens.* November 13, 1894. Patient is a rather sparely built woman, slender, about five feet in height, weight one hundred pounds. Is slightly emaciated; rather pale. Makes no complaint except of pain in the affected muscles, especially when they are touched or moved. Appetite fair; sleep only occasionally disturbed by pain. General adenopathy; cervical glands but slightly enlarged, axillary and inguinal affected to a greater degree, either cubital gland the size of a small bean. Head, face, eyes, ears, throat, larynx negative; no scars in throat. Heart and lungs negative. Abdomen negative. No splenic or hepatic enlargement. Bones negative. Pelvic organs negative. Uterine cervix smooth, unlacerated, conical; os uteri small. Slight leucorrhœal discharge which is said to be of long standing. No vaginal cicatrices. Rectum negative. Urine shows neither sugar, albumin, nor casts. Blood in fresh and stained specimens showed no change in color, shape, or size of corpuscles; no parasites. There was a slight oligocythæmia, with corresponding oligochromæmia; a slight increase in the polynuclear white cells—a leucocytosis.

The supinator muscle of the right forearm showed a very slight induration, which in the course of a few days had completely disappeared, the muscle performing its function in a normal manner. The right leg, the one first affected, was swollen in the region of the calf-muscles, though the patient said the swelling had gone down a great deal. There was a hard, board-like, brawny feel—a hard œdema. Extensive movement of the foot caused great pain, as did pressure. The calf-muscles of the legs looked as they do in pseudo-hypertrophic muscular paralysis. There was a uniformly rounded, bulging contour of the calf, which showed in striking contrast to the small frame of the woman and the other moderately developed muscles. Everywhere over this area there was great tenderness on pressure, the patient saying it was "as sore as a boil." The subcutaneous tissue seemed œdematous, but the pitting made by pressure was recovered with a sort of elastic bound of the skin. The skin was but slightly reddened over the affected area. No rash was to be seen, nor could any history of a rash be elicited. The patellar reflexes were exaggerated. There was slight ankle-clonus.

The temperature on admission was  $99.6^{\circ}$ , and varied during her five weeks' stay in the hospital between  $97^{\circ}$  and  $101^{\circ}$ , usually being between  $98.6^{\circ}$  and  $100^{\circ}$ . There was no regularity about these slight rises, and the patient never presented any of the ordinary constitutional effects of fever. The respiration varied between 18 and 24. The pulse was, on the average, 90. Persistent inquiry as to the eating of poorly cooked

pork was always met with the answer that no pork of any sort had been eaten, and that no one else in the household was similarly ill.

November 23d, under strict asepsis, with ether as an anæsthetic, I made an incision into the left gastrocnemius in order to obtain a piece of the muscle for examination. A moderate inflammatory œdema was met with in the skin and subcutaneous tissue. On cutting through into the muscle about two to six drachms of light brownish-red fluid, with a few small dark-red fragments of old clotted blood, escaped. A small piece of the gastrocnemius was cut out for examination. Cultures from the fluid outside the muscular fascia were negative. Agar and gelatine cultures from the fluid that was contained in the muscle proved sterile. Cover-slip preparations and sections of muscle stained for bacteria failed to reveal any micro-organism. The microscopic appearance of the stained section will be spoken of later.

Fearing the wound was already an infected one, I packed with gauze. It later, at some dressing, became infected, and for a few days discharged a yellow pus, healing in about ten or fourteen days.

The patient had, while in the hospital, no medicine internally up to November 20th, save an occasional cathartic, or a dose of antipyrin to relieve pain. November 20th she was given eighty grains of iodide of potassium a day. It is to be remembered, however, that before this drug had been given the initial swelling in the supinator muscle had completely disappeared; the one in the right calf had diminished in size by one-half, and the left calf was not paining so much. Wet boric-acid dressings had been constantly applied from the time of entrance to the hospital.

December 12, 1894, she left the hospital, able to walk, though with a limp.

I saw her at her home a few weeks later. The supinator and right calf-muscles were apparently normal. The left calf showed still a little hardness, and forced extension of the foot caused a feeling of tension in the calf with slight pain. The patient was inclined to favor the left leg a little in walking. There was no atrophy discoverable. Reflexes normal, glands much smaller.

Sections of the excised piece of muscle showed extensive and diffuse inflammatory changes. The muscle-fibres varied in size, were of homogeneous appearance (hyaline degeneration); in only a few specimens could faint transverse striæ be found. There was pronounced nuclear proliferation, many mitotic figures being seen. Large round and oval cells, believed to be proliferating nuclei, formed a prominent part of the picture. Spaces were seen here and there, looking as though a fibre had disappeared. Some fibres seemed to be split longitudinally. Everywhere between the bundles of fibres and between the separate fibres, and particularly about the vessels, there were aggregated polynuclear cells. Hemorrhagic extravasation was prominent in one portion of the specimen, and blood-pigment could be seen here and there where no hemorrhage could be made out. The piece excised showed, therefore, advanced diffuse hemorrhagic myositis. No trichinæ were found, nor, as said, any bacteria.

**RECAPITULATION OF CASE.** Woman, aged twenty-four years syphilitic, has suddenly developed in supinator longus a painful swelling; two days later right calf-muscles and three weeks later left calf-muscles similarly, but more diffusely, involved. Swelling, pain, tenderness, board-like hardness over muscles. No abnormal sensations, no nerve-tenderness; reflexes slightly increased; general adenopathy; no eruption; no profuse sweats; subsidence of evidences of inflammation in arm and right leg, the only medication being the inunction with the iodine unguent. No history or evidence of traumatism nor of infection save syphilis. Examination of muscle shows diffuse inflammation attended by hemorrhage; no parasites, animal or vegetable, discovered.

*Diagnosis.* Polymyositis acuta diffusa hemorrhagica syphilitica.

While this case does not, I believe, belong in the category of the classical primary acute polymyositides, it presents so many points of resemblance to these cases that I feel warranted in reviewing briefly what is known concerning this interesting, and until recently wholly unknown, affection. The disease to which the name polymyositis acuta has been given was first accurately described in 1887 by Unverricht, Hepp, and E. Wagner. Unverricht's case was as follows:

A previously healthy stonemason, aged twenty-four years, had pain in arms, legs, later in abdominal muscles. On twenty-second day, swelling of affected muscles. Face, including lids, œdematous. Urticaria-like eruption on forehead. Profuse sweats; spleen enlarged; fever up to 38.5° C. Later involvement of muscles of deglutition and respiration; lobular pneumonia; death on thirty-fourth day. No nerve-symptoms.

*Autopsy.* (Marchand.) Myositis acuta præcipue musculorum extensorum extremitatum; anasarca et œdema intermusculare; hyperplasia lienis; pneumonia lobularis confluens duplex. The muscles were swollen, dull, lustreless, grayish, with hemorrhagic reddish areas. Diaphragm and eye muscles negative. No trichinæ. No culture-experiments. Microscope showed interstitial round-cell infiltration, large and small hemorrhagic extravasations, muscle-substance in all stages of degeneration, striæ in places completely lost, fibres swollen, often granular, hyaline, or fatty.

Unverricht compares his case with those of Scriba. The latter's case was one of multiple muscle-abscesses healing under evacuation of pus. A lesion of the skin or mucous membrane was, in Scriba's case, reasonably regarded as the infection atrium. Unverricht differentiates his case from the periarteritis nodosa of Kussmaul and Maier, where, with pain, swelling, hyperæsthesia, paralysis, albuminuria, there were found under the skin of the abdomen grape-sized nodes that under the microscope were shown to originate in the wall of the artery, and secondarily to involve the muscle.

Debove's and Eisenlohr's cases he believes to be neurotic, spinal in the one, peripheral in the other. In Eisenlohr's case, neuritis was found with atrophic paralysis.



The disease he believes to be of infectious origin, and raises the question whether or not some of the cases of so-called trichinosis have not been cases of polymyositis.

"Whether in all cases the course is progressive or whether lighter forms of the disease that up to this time have sailed under another flag do not occur, it is impossible to decide from the observations of a single case." (Page 549.)

Hepp, at about the same time, from Kussmaul's clinic in Strasburg, reported a case under the title, "Pseudo-trichinosis, a peculiar form of acute parenchymatous polymyositis." He found but two cases at all resembling his, those of Potain and Marchand, both, though reported under different names, now generally regarded as cases of polymyositis acuta. His case he calls "Ein blossen curiosum."

*Hepp's Case.* Female, married, aged thirty-six years. After two or three weeks of anorexia, malaise followed by sore throat, dry mouth, red gums, exanthem on face and chest—pain and swelling appeared in the muscles of the shoulders, neck, extremities, attended by the hard œdema. There were sweats, sleeplessness, dysphagia, cramps, albuminuria, fever even to 40° C. The sensorium was free, sensibility unaltered, patellar knee-jerk lost. Death from lobular pneumonia and suffocation, after eleven weeks.

*Autopsy* (Recklinghausen). Firm œdema; panniculus adiposus scanty; subcutaneous connective tissue moist; muscles reddish-yellow with hemorrhagic areas, moist, easily fractured; ocular and diaphragmatic muscles unchanged. Lobular pneumonia, right hydronephrosis.

*Microscopically.* No trichinæ. Muscles showed hyaline or waxy degeneration, striæ faint or lacking, muscle in places granular. Round cells in perivascular connective tissue and in vicinity of degenerate muscle. Peripheral nerves and cord negative.

Hepp's second case was an epileptic, aged twenty-one years, who, during a fit, bit the tongue. Glossitis and inflammation of many muscles of the body followed. Pseudo-fluctuation led to exploratory puncture of muscles, but no pus or bacteria were found. A sciatica due to pressure of swollen muscles led to exposure of sciatic nerve for purposes of stretching and the nerve was found normal. An urticarial eruption was present. Spontaneous recovery followed.

E. Wagner's case, reported in 1887, with Unverricht's and Hepp's furnishing the standard of comparison for all subsequent writers, is as follows:

A female cook, aged thirty-four years, a sufferer from chronic pulmonary tuberculosis of light grade, developed pain, swelling, firm œdema over the muscles of the shoulders and upper extremities. An erysipelas-like exanthem appeared on either arm. No electric changes, no nerve-tenderness. Gradually subsided, but dysphagia and suffocative attacks developed, and in one of latter, patient died.

*Autopsy.* Moderate chronic pulmonary tuberculosis; diffuse bronchitis; pulmonary emphysema with slight œdema; brown atrophy of heart; right ventricular dilatation; fatty liver; tubercular ulcers in ileum and colon; perimetritic adhesions; hyperæmia of brain and cord; extensive myositis with slight œdema of upper portion of body.

The affected muscles showed interfibrillary hemorrhages. The muscle-fibres were many of them homogeneous, with striæ faint or invisible. There was marked round-celled infiltration, with some large multinuclear giant-cells. It is of special interest that in one and the same muscle-bundle vari-

ous changes were occurring simultaneously. Thus were found fatty degeneration, waxy degeneration, diffuse and localized serous infiltration with well-marked regenerative changes in the muscle-substance and in the connective tissue.

No tubercle-bacilli were found. In three hundred transverse and longitudinal sections three trichinæ were detected. Wagner excludes trichinæ as the cause of the myositis on the following grounds :

1. The non-characteristic beginning of the disease, with no stomach- or bowel-disturbances.

2. The order of involvement of muscles and the sparing of the lower extremities.

3. The small number and the age of the trichinæ, the latter according to Leuckart, to whom the specimens were submitted, being at least four months old.

As there was some atrophy and some slight change noted in one of the peripheral nerves examined, Wagner is willing, though regarding the case as one of polymyositis, to admit that neuritis may have been a feature of the case.

Wagner now believes, and others as well, that another case of his reported thirty years ago was one of acute polymyositis.

Löwenfeld records a fatal case in which, with some breaks in the history and with no autopsy, there was yet enough to warrant a diagnosis of polymyositis. The case (in a male, aged fifty years) is peculiar in that the myositic trouble began apparently in the heart-muscle, gradually extended to other muscles of the body, the inflammation in separate muscles running an acute course and being followed by atrophy, which was, in the case of most of the muscles, partially or wholly recovered from. In this way, with alternating improvement and relapse, the patient lived for two years, death being preceded by dysphagia, irregular and weak heart. No changes in sensibility, no tenderness over spine or nerves could at any time be made out. A pigmentation of irregular distribution not unlike that of Addison's disease was present during a portion of the time, fading out toward the last. Löwenfeld admits that his case may possibly be a case in which there was involvement of nerves as well as muscles—a neuro-myositis.

Strümpell's patient, without known cause, was seized with nausea, vomiting, headache. Then pain in the arms and legs. Swelling most marked in muscles of the legs. Pain in chewing, speaking, swallowing. Tenderness over all affected muscles. Stomatitis. Sensibility normal. Patellar reflex weak. Reaction to both currents feeble. Ptosis; ocular paralysis. Death.

Cord and nerves negative. Muscles showed finely granular cloudiness, loss of transverse striæ, hyaline degeneration, vacuolation, increase in muscle-nuclei, numerous foci of true interstitial myositis.

Plehn's case was one of an acute infectious form with high fever, splenic tumor, œdema, roseola, herpes, recovery in twelve days, with no atrophy, contractures, paralyses, or disturbances of sensibility.

George W. Jacobi reports a case of subacute progressive polymyositis with fatal outcome. Microscopically there were waxy and fatty degeneration of muscles, increase in connective tissue; secondary changes in nerve-branches probable.

Fenoglio's case was attended by pain, œdema, slight atrophy in various muscle-groups. Inflammatory changes were present in both muscles and interstitial tissue.

Prinzing's case, a male, aged fifty years, lasted five months. It was diag-

nosed in succession as rheumatism, periostitis, thrombosis. Many muscles were involved. There was moderate fever, no splenic enlargement. Patellar reflex absent. Dysphagia and cardiac irregularity were present.

Post-mortem, hemorrhagic areas were seen. The muscle-fibres varied in size, showed vacuoles often filled with detritus, loss of striæ. There was longitudinal splitting of fibres, nuclear proliferation. No bacteria. One nerve seen, was normal.

Prinzinger refers to Gies's case as somewhat similar. In this case the quadriceps and triceps femoris were involved, being hard, tender, oedematous, the muscle showing waxy degeneration, the bone which was at first thought to be diseased being negative.

Waetzoldt's first case was in a woman where following, or at the same time with, a puerperal sepsis a polymyositis developed. Micrococci were found in the muscles post mortem.

His second case was likewise a post-partum case, where a perimetritic exudate seems to point to the uterus as the avenue of infection and the polymyositis as secondary. The patient recovered.

Waetzoldt cites cases of Winckel's and Fenoglio's as similar to his.

Senator's two cases are cases of myositis and neuritis :

CASE I.—Male, aged twenty-seven years ; pulmonary tuberculosis ; disturbance of sensibility, paralytic contracture of lower extremities with atrophy, nerve-trunks tender, reflexes abolished, reaction of degeneration, fever.

*Autopsy.* Ulcerative pulmonary tuberculosis ; acute splenic tumor ; parenchymatous and interstitial neuritis, cord negative ; acute interstitial myositis with muscular atrophy. No tubercle-bacilli in nerves or muscles.

CASE II.—Male, aged thirty-three years. Muscular pains, nerve-trunks at first not tender. Later paræsthesiæ, nerve-tenderness, atrophy of muscles.

Excised piece of muscle, acute interstitial myositis with beginning cirrhosis of muscle ; numerous Mastzellen.

Senator concludes that inflammation can begin primarily in the muscle and extend to the nerve, or *vice versa* the nerve may be primarily inflamed, the muscle secondarily. And believing, as he does, that the disease is of infectious origin, he thinks that the infectious material or the chemical poison may at one time affect one part of the motor mechanism, at another another. If localized in the cerebral motor areas, a cerebral paralysis will follow ; in the anterior horns, a paralysis of the infantile spinal paralysis type ; in the nerves, a peripheral neuritis ; in the muscles, a myositis. Various combinations of these types he believes possible.

Somewhat similar views were expressed by Hoffmann, of Heidelberg, at a meeting of neurologists in Baden-Baden in 1894, his observations being made on a case of neuromyositis multiplex in a male, aged seventy years, that ran a fatal course in sixteen days.

In the discussion, Edinger and Siemerling agreed with Hoffmann as to the difficulty in diagnosis between the affections of many nerves and many muscles, and the former recalled the similarity between these cases and Kussmaul's periarthritis nodosa.

Handford reports a case of disseminated myositis and neuritis with hemiplegia, terminal gangrene, pigmentation of the skin, and followed by muscular atrophy.

Unverricht, in 1891, reported a second case. This was in a pregnant non-



syphilitic woman, aged thirty-nine years. The muscles involved were those of the legs, abdomen, chest, and later the face. There were great pain, swelling, itching; the eruption was urticarial. Labor in the case was natural, uneventful; the child healthy. No excision of muscles allowed. After five months there was no muscular atrophy, no reaction of degeneration, and but a little tenderness and induration remaining. The great involvement of the skin and subcutaneous tissue led Unverricht to call this case one of dermatomyositis. He believes the disease is infectious; that possibly it is a primary dermatitis and secondary myositis, or *vice versa*.

Senator, in 1893, reports two cases of great interest :

CASE I.—Male, six years a diabetic, aged fifty years. Sick for two weeks with muscular pains, swellings, eruption resembling that of erythema nodosum, fever, typhoid state. Microscopic examination showed extensive interstitial myositis, with hemorrhages, increased nuclei, etc. No parasites or protozoa. Senator does not believe the diabetes had any influence in producing the myositis.

CASE II.—Male, aged forty years, early in June, 1893, ate some partially spoiled crabs. Suffered soon after from anorexia, sleeplessness, malaise, stiff, painful feelings in legs. The pains increased and by last of June a physician was consulted. There was moderate fever. The right upper and lower extremities were greatly swollen, resembling massive columns; the skin was reddened. There was pain in swallowing and in loud speech. An acute hemorrhagic nephritis occurred as a complication. Recovery ensued in August, 1893. Senator inclines to exclude trichinosis, and to look upon the case as an intoxication from the spoiled crabs.

Herz believes mild cases often go under the name of rheumatism. The probability of an infectious origin is strengthened by two favorable cases occurring in two girls occupying the same room, one case rapidly following the other.

He cites two cases with fatal results in the practice of Wermann, of Dresden. The involvement of the skin leads him to call the affection "dermatomyositis."

Lewy records four cases that he regards as polymyositis acuta, three being in the same family and seeming to indicate the possibility of contagion. The case occurring last was one of extreme mildness and looked upon by Lewy as an abortive polymyositis.

Lewy tabulates the cases reported up to 1893, and finds with his four cases twenty-one that he regards as acute polymyositis.

Buss, also, under the title dermatomyositis, reports a case in a male, aged twenty-two years, in whom there were acutely developing painful swellings in the muscles, hemorrhages with later discoloration of the skin, splenic tumor, hemorrhages from the bowels, stomatitis with oral hemorrhages, angina, effusion into left knee. Recovery in six weeks. There is, however, in this case such a striking resemblance to scurvy that one must hesitate before classing it as polymyositis in its restricted sense.

C. Boeck, in a case of polymyositis, where, through a misunderstanding as to directions, immense quantities of copaiba were rubbed into the skin, believed that the copaiba was the cause of the inflammation of the muscles as well as of the skin. The patient was a male, aged twenty-one years; gonorrhea two months before. For six days after the copaiba was stopped large quantities were eliminated by the urine. The well-known effect of copaiba on the vasomotor nerves of the skin leads Boeck to think it affected in this case the vasomotor nerves of the subcutaneous tissue and muscles as well.

*Etiology.* A study of the cases reported under the head of acute polymyositis still leaves us as much in the dark concerning the etiology as when Strümpell wrote in 1891, "The cause is yet entirely unknown."

There is a general belief in the infectious origin. In some cases, as in Waetzoldt's and Winckel's, micro-organisms were found in the muscles. These cases were, however, atypical and a definite puerperal infection was present. The fact that in some cases, *e. g.*, Prinzing's and Hepp's, ordinary methods of examination have failed to reveal bacteria lends color to the theory of an intoxication-myositis, but no toxin has yet been proven. Winckel believed in his case that a toxic fluid substance was more the cause of the myositis than the few bacteria found. Again, the occurrence in the lower animals of myositis due to animal parasites—protozoa—the presence in a man of a well-defined muscle-parasite, the trichina spiralis, has drawn attention to the possibility, or, as Pfeiffer believes, the probability, of many of these cases being due to a protozoon, a sporozoon of the group gregarinæ—myositis gregarinosa. Specimens from muscles have been submitted to Pfeiffer from the cases of Strümpell and Unverricht, but no evidence found of the protozoa. Still Pfeiffer contends that the method of preservation and preparation of the specimens is injurious to the easy recognition of the animal parasites, and that they may be present, though unrecognizable. He calls attention also to the fact that in the hog Virchow observed a skin-rash in a case of gregarinal myositis, strikingly analogous to the skin-lesions so frequently observed in the acute polymyositis of man.<sup>1</sup>

Lending color to the argument in favor of an infectious origin is the oft-observed splenic tumor, fever, angina. In some cases, too, possible infection atria have been noted in ulcerating pulmonary phthisis, tubercular ulcers of the intestine, a wound of the tongue, an infected uterus. Scriba, in cases of infectious myositis, believed a break in skin or mucous membrane gave entrance to the organism or virus.

Boeck's case seems to favor the intoxication-hypothesis, and possibly the case of Senator, where the stale crabs were eaten, would be looked upon as arguing in the same direction, yet one feels sure that Pfeiffer would contend that the crab may have been poorly cooked and infected with muscle-parasites. The cases of syphilitic myositis seem to indicate that toxic substances may be the exciters of inflammation of many muscles.

In this connection I cannot refrain from thinking that Wagner, in his case where trichinæ were found, has been almost too positive in ignoring entirely the trichinatus origin of the inflammation, even though sup-

<sup>1</sup> It is interesting in this connection to recall the fact that Klebs (Virchow's Zeitschrift, 1891) records a case of muscular atrophy in which he came to the conclusion, after repeated examinations of specimens, that the cause was a parasite which he calls *gregarina hyulogenes*. This parasite he took at first for muscle-nuclei.

ported by the authority of a Leuckart. While three trichinae in three hundred sections are not many, they are still abnormal. And it is not impossible that the trichina in its progress to its final resting-place in the muscle—and its course is still unknown—may excite inflammation even in places where it does not lodge. It may, it is conceivable, carry with it or allow to escape with it through the intestinal wall, other microparasites or toxins.

A very interesting case of mixed infection with trichinae and anthrax has been reported by Zörkendörfer from Chiari's laboratory. From the muscles of four persons dying during an epidemic trichinae were found, but in small numbers, and only after most persistent search, even in acutely inflamed muscles. But in the muscles, in the heart blood, in the spleen, were found bacilli morphologically and in other particulars resembling anthrax-bacilli. In the sections were found marked interstitial myositis, an occasional trichina, and the anthrax-bacilli. These cases indicate that trichinosis can only be excluded after most diligent search, and that trichinae may still be present in an inflamed muscle though not found in all or even any great proportion of the inflamed areas. It may be of interest to note that in examining some of the suspected sausage many Mieser's tubes (Miesersche Schläuche) were found.

The contagious character of the affection is hinted at by some observers, particularly Herz and Lewy. No cases have been reported in children.

**PATHOLOGY.** The inflammatory process in the muscle presents no peculiarities differentiating it from any other acute myositis. At times the process is chiefly interstitial, at times parenchymatous, again it is diffuse. The muscle-fibres frequently show waxy or hyaline degeneration; the striæ may be partially or wholly destroyed. There may be longitudinal splitting and vacuolation. Regenerative changes are prominent. Increase in nuclei is noted in almost every case. Large cells with solitary or multiple nuclei are frequently seen. Senator, in one of his cases, met three classes of cells: 1. The normal oval form, which on separate fibres can be seen in increased numbers; 2. Large oval cells with coarsely granular protoplasm and clearly visible nuclear body; 3. A cell a little smaller than the last, circular, distinctly stained, without visible nuclear body. I refer to this because in the specimen from my own case the large round or oval cells were very abundant. Hemorrhage is a part of the pathological process in most cases. Interstitial inflammatory changes are usually noted, the collection of round cells being very great. The subcutaneous tissue shows an inflammatory oedema. The involvement of the skin in erythema, urticaria, erysipelas-like inflammation, has led some observers to speak of the disease as dermatomyositis. The muscles involved are usually first those of the extremities, from which the process may extend to all the muscles of the body, including the face, the mus-



cles of respiration and of deglutition. In one case the heart-muscle was probably involved.

Pfeiffer, who examined the specimens from Unverricht's and Prinzing's cases, says that the characteristic change is the hemorrhagic inflammation in the interstitial structure between the muscles, with granular secondary degeneration of muscle-cells. The microscopic pictures, with nuclear proliferation, connective-tissue bands, and atrophy of muscle-cells, resemble those already mentioned as met with in infected horseflesh. Prinzing's case resembled the muscle of rabbits after the injection of sarcosporidia.

In some cases, notably those of Senator, the nerves had been demonstrably involved. Whether this is primary or secondary to the affection of the muscle, or whether both nerve and muscle are simultaneously affected, cannot be definitely decided. It is well to recall Senator's theory that there may be a common cause for this peculiar affection of the muscles, for some forms of peripheral neuritis, for inflammation of the anterior horns, and for some forms of encephalitis, this cause affecting at one time one portion of the motor tract, at another another portion, while again it may, as in cases of neuromyositis, affect the nerve and muscle together.

**SYMPTOMATOLOGY.** The first pictures of the disease drawn by Wagner, Hepp, and Unverricht were quite well defined. The reports from later cases, however, necessitated a modification of these typical cases. Löwenfeld, from a study of the cases up to 1890, gave the following group of symptoms as characteristic of acute polymyositis: 1. A swelling of the extremities, due to the indurative œdema of the subcutaneous cellular tissue, and in part to the increased volume of the muscle. Joined with this is a corresponding functional disturbance in the affected member. 2. The spread of the inflammation to the muscles of respiration and deglutition, with corresponding loss of function in these muscles. 3. The appearance of a more or less extensive exanthem. Moderate fever, profuse sweats, splenic tumor, with death from inhalation-pneumonia or from suffocation, were common events. Since Löwenfeld wrote, favorable cases have been reported, and cases in which some of his classical symptoms have been absent. Strümpell calls attention to the fact that stomatitis and angina are common. Pigmentation of the skin has been reported. The muscles of the face, the tongue, the heart, and even the diaphragm, that were supposed to be commonly spared, have been found involved. The kidneys in two instances have been acutely inflamed. It is therefore clear that no definite complexus of symptoms can yet be described as peculiar to this affection, and no sharp line can be drawn until the etiological factor is better understood. It is not improbable that there are cases of myositis due to some definite organism or toxin, and other cases closely resembling these due to other organisms or toxins, just as

we have true cases of diphtheria due to a definite bacillus, and other cases simulating a true diphtheria due to other organisms. It is not improbable either that some cases—particularly the milder ones—classed as acute polymyositis may have been due to the virus of syphilis. In only a few reported cases is it specially stated that the patient was not syphilitic.

A most interesting observation is that made by Lewy in his three cases, where there was apparently a contagion. The second and third cases which he reports are, however, extremely light, the third case, as he himself says, if it is a case of polymyositis, being one without inflammation of muscles, without general disturbance, with nothing but a purpuric rash, and only regarded as a case of polymyositis because occurring in a family where two other cases had been present, each with the same purpuric lesion. It is, in other words, an abortive polymyositis. Here the diagnosis is only probable, as no accurate standard is yet known.

The diagnosis of this condition presents two chief difficulties, the differentiation from trichinosis and from polyneuritis. Among other affections that should be remembered must be mentioned pyæmic abscesses, multiple thromboses, periostitis and osteomyelitis, rheumatism.

From trichinosis it can in some cases only be diagnosed by the excision of the muscle and a thorough examination for the parasite. As aids to diagnosis may be mentioned the fact that in acute polymyositis there is not the history of eating uncooked or raw pork, and it is the exception that other members of the family or household should be affected. Secondly, the primary gastric and intestinal symptoms are more pronounced in trichinosis. Thirdly, in trichinosis there are early and prominent symptoms of involvement of the muscles of the eye and of the diaphragm. The latter is commonly spared in acute polymyositis; yet it must be remembered that in Strümpell's case the eye, and in Wagner's late case, the diaphragm, were involved. Lastly, the exanthem is usually more pronounced in polymyositis than in trichinosis.

From polyneuritis the disease is differentiated by the following facts: In acute polymyositis there is, 1. No nerve-tenderness. 2. No anæsthesia or paræsthesia. 3. The skin is not trophoneurotic as in neuritis. 4. The paralysis is due merely to mechanical interference. 5. Skin and muscles in polymyositis are peculiarly cedematous. 6. There is no rapid muscular atrophy. The reflexes and electrical reaction are as yet of uncertain value in making a differential diagnosis. (Senator.) The possibility of combinations of these two forms should, of course, be remembered.

**PROGNOSIS.** The prognosis, at first uniformly regarded as fatal, must now be modified. It can be said in general that the severer the onset, the greater the number of muscles involved, the higher the temperature, the graver the prognosis. The involvement of the muscles of respiration

and of deglutition results usually in death from inhalation-pneumonia. Myocardial involvement gives the added danger of cardiac failure.

**THERAPY.** Until the cause is known treatment is purely symptomatic.

*Myositis Syphilitica.* The literature on syphilis of the muscles is rather imperfect and meagre. Two forms are recognized, the gummous or circumscribed, the diffuse, and, according to some, a combined form. I make free use in what I say of syphilitic myositis, of a monograph by Lewin in the *Charité Annalen*, 1891.

Ricord in 1842 was the first to characterize an interstitial myositis, distinguishing it from the gummous, as a special form of syphilitic infection.

The microscopic changes in this form of myositis are very nearly identical with those described as characterizing acute polymyositis. There is marked interstitial infiltration with round cells. Later, if the disease is subacute or chronic, the development of fibrous tissue with contraction and induration plays a prominent part. Proliferating changes are present in the muscle-nuclei. The increase in muscle-bodies can reach a high grade. "The cells are seen arranged in varied forms in thoroughly compacted groups of from three to fifteen. These proliferating cells lie in part between the peripheral bundles, and in part press themselves into the same." The muscular fibres lose somewhat their staining capacity, may become pale, their contents granular, the striæ lost, fibres smaller and perhaps longitudinally split.

Lewin, while admitting that gummata may develop later in a muscle that is diffusely inflamed, does not believe that interstitial or diffuse syphilitic myositis is "a stepping-stone between the irritative stage and the gummous" any more than is an interstitial orchitis or hepatitis.

Ostermayer believes in a combined form where, in addition to the diffuse inflammation involving the entire muscle and producing the board-like hardness, there is a circumscribed, nodular gummous mass tending to break down, and, as in Ostermayer's cases, three in number, to discharge through the skin as a fistula or ulcer. This form he plainly differentiates from the multiple gummata of a single muscle, where several nodules are scattered through a muscle with intervening healthy tissue. In his combined form there is an involvement of the entire muscle with, in one place, a gumma. He regards the case of Bramann (*Berl. klin. Woch.*, 1889), that Lewin looks upon a diffuse syphilitic myositis with later development of gumma, as an excellent example of the mixed form.

**ETIOLOGY.** Lewin finds records of forty-five cases, six of which occurred in his own practice. Twenty-six were males, fifteen females. Occupation seemed to have no influence in the production of this affection. The age agreed with the age at which syphilis in general appears. From the sixteenth to the fortieth year the majority of cases were found. The cases were met with in strong, vigorous adults in private practice,



as well as in frail, weak, anæmic hospital prostitutes. Lewin believes that previous failure to treat syphilis makes the later manifestations, including myositis, more severe. The time of its appearance varied. In several cases it occurred within one year after infection; in other cases as late as fifteen years after infection. Jullien found one case in the secondary period of syphilis, one four, one four and a half, one five, one five and a half, and one seven years after infection. Ostermayer regards syphilitic myositis as distinctly a late manifestation, only exceptionally early. Complicating the myositis the syphilitic exanthemata were frequently observed—macular, papular, squamous being reported. Ulcerating and nodose skin-lesions, condylomata, ulcers of the pharynx, exostoses were also concomitants of the muscle-inflammation. The muscles affected were varied, oftenest the biceps brachii. The left biceps muscle was affected more frequently than the right, so that Lewin is inclined to exclude excessive work or strain upon the muscles as a cause of the localization of the syphilitic process. Next in frequency may be mentioned the external sphincter ani—Neumann emphasizing the fact of the frequency of this location—the masseter, the deltoid, the sterno-cleido-mastoid, the gastrocnemius. One muscle was affected in twenty-one cases, several muscles in twenty-three cases. No definite exciting cause, as a blow, a cold, straining, could be found.

**SYMPTOMATOLOGY.** Pain calls attention to the affected muscle. Lewin and Billroth both believe the pain is due more to the involvement of the bone and periosteum than to the affection of the muscle itself. Radiating pain is not uncommon. The pain may be nocturnal. The muscle naturally becomes somewhat weak. Pain prevents an accurate test of its strength. Flexion and pseudo-joint contractures may occur. In cases of doubt chloroform can be employed showing that the joint itself is uninjured. Spasm of the muscle is common. One of Gujot's patients broke a molar tooth through spasm of the masseter. Tenesmus, where the sphincter ani is involved, is very annoying. In Lewin's case, where the gastrocnemius was involved, the extension of the foot produced painful attacks of cramp. In the case which I report, severe pain was produced by extension of the foot, and there was a fairly well-marked ankle-clonus. Redness, swelling due to œdema, and increase in volume of the muscle are to be noted. Following the pseudo-hypertrophy of the muscle there may be atrophy and induration due to the development of connective tissue. Later fatty degeneration or ossification may occur. In some cases of extensive atrophy it is probable that the nerve itself was involved. As to site of election no one muscle seems to be preferred.

In the differential diagnosis a history of syphilis with other evidences of it are, of course, of great value. The diagnostic employment of anti-syphilitic remedies is of great value. It must be differentiated from rheumatism of the joint and of muscles, from inflammation of tendons, from

lumbago, from tetanus, from torticollis, from tumors, from cold abscesses, from exostoses, from mumps and facial paralysis, from trichinosis, from acute polymyositis.

The treatment consists in massage, electricity, the application of wet dressings, the use of mercury and potassic iodide. The disease may disappear rapidly or may be slow in yielding. Myotomy has been employed where the sphincter ani has been involved.

In the case I have reported four diagnoses come up for consideration—polyneuritis, trichinosis, polymyositis acuta, myositis syphilitica.

Polyneuritis is excluded by the peculiar limitation of the disease to regions of separate muscles and not separate nerves, by the absence of pain except on movement or pressure, by the absence of nerve-tenderness, paræsthesiæ, trophic changes, atrophy and paralysis, by the increased knee-jerk.

Trichinosis I exclude by the positive statement of the patient that she had not for several weeks before becoming ill eaten pork in any form, by the total absence of gastro-intestinal symptoms, by the limitation of the affection to three muscles, the diaphragm- and eye-muscles being spared, and by the failure to find trichinæ in the excised piece of muscle.

The case seems to have been one of acute polymyositis or of syphilitic myositis. If belonging to the former class, it is atypical in its benign course, involvement of a comparatively few muscles, absence of splenic tumor, of exanthem, of profuse sweats, persistence of patellar reflex. In the presence of definite symptoms of previous syphilitic infection and of the present activity of the syphilitic virus (adenopathy), and with a knowledge that syphilis does, though rarely, attack a muscle or muscles, producing a diffuse inflammation, one feels justified in regarding this as a case of syphilitic myositis. This I believe to be the fact notwithstanding the patient's and her physician's statement that no antisyphilitic remedies had been given before her entrance into the hospital, at which time there was but a slight relic of the affection in the muscle first inflamed. Syphilitic processes not infrequently in the primary, secondary, and even tertiary periods undergo spontaneous recovery or are apparently self-limited. And in this case there had been applied to the muscle first affected an ointment containing the antisyphilitics iodine and iodide of potassium, and this may well account for the somewhat rapid disappearance of the swelling in the two muscles first affected, over which muscles alone it was used.

The circumscribed, freely movable, and softer character of the swelling in the supinator longus, even though the muscle is itself a smaller one, suggests the possibility of the gummous character of the lesion. While there can be no question of the diffuse nature of inflammation in the calf-muscles of the two legs—using the word diffuse as implying an involvement of the entire muscle and not of some limited area—the fact

that on cutting into the muscle a rather thick, brownish-red, sterile fluid was encountered, makes one think that possibly here a small gumma had broken down. In other words, there are, it seems to me, some grounds for regarding the case as one of mixed or combined syphilitic myositis as described by Ostermayer.

CONCLUSIONS. 1. There is a definite disease primarily affecting many muscles of the human body and described as polymyositis acuta, pseudo-trichinosis, or dermatomyositis.

2. Inflammatory swelling of muscles, exanthem, splenic tumor, extension to the muscles of deglutition and of respiration, death, characterize the most typical cases.

3. Atypical and milder cases indicate that either the disease may run a benign course or that in the absence of definite means of differential diagnosis forms etiologically differing are confused.

4. Trichinosis and polyneuritis must always be excluded.

5. Syphilis may attack many muscles and, resembling acute polymyositis, must be excluded.

6. The etiology is still unknown.

7. Three hypotheses can be advanced as to its cause: 1. That it is due to a specific micro-organism (vegetable parasite). 2. That it is due to a chemical poison (toxin). 3. That it is due to an animal parasite (gregarina).

8. In doubtful cases the excised piece of muscle should be examined not alone for trichinae and bacteria, but as well, by special methods, for protozoa.

9. Failure to find trichinae in all areas showing inflammatory reaction, or even in the majority of such areas, does not exclude trichinosis as the primary cause of the myositis. Only repeated failure to find trichinae after thorough examination enables one positively to assert that the case is not one of trichinosis. (Compare examination of sputum or tissue for tubercle-bacilli.)

10. Syphilitic myositis occurs in three forms—the gummous, the diffuse, the combined.

11. The diffuse syphilitic myositis is usually a late manifestation of syphilis; appears without definite exciting cause; affects no particular muscle by preference; often involves more than one muscle; may resemble acute polymyositis.

My thanks are due to Drs. S. G. West, G. H. Weaver, E. R. Le Count, D. D. Bishop, and Lawrence Ryan for kind assistance in the observation of this case and in the preparation and examination of bacteriological and microscopical specimens.



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# THE INFLUENCE OF ALCOHOL AND ALCOHOLIC DRINKS UPON THE CHEMICAL PROCESSES OF DIGESTION.

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(Concluded from p. 324.)

## INFLUENCE OF THE SO-CALLED FUSEL OILS UPON THE AMYLOLYTIC ACTION OF SALIVA.

SINCE the preceding results obtained with whiskey indicate that the retarding action of this liquor upon salivary digestion is mainly associated with volatile matters other than ethyl alcohol, we have tried a few experiments<sup>1</sup> with the alcohols liable to be present in the so-called fusel oils with a view to ascertaining their influence upon the amylolytic action of the salivary ferment. As already stated, we have very little personal knowledge concerning the presence of fusel oil in the distilled liquors of the whiskey type. Such tests as we have made in this direction have either given negative results, or else have shown the presence of these oils in very small amounts only. Still, as they are generally considered as impurities common to low-grade liquors, it is desirable to know something concerning the action of the alcohols present in them.

### AMYL ALCOHOL.

#### *Experiment 133.* (Saliva 1:4.)

| Amyl alcohol. | Reduced copper in $\frac{1}{4}$ . | Maltose formed. | Relative amylolytic action. |
|---------------|-----------------------------------|-----------------|-----------------------------|
| 0 per cent.   | 0.1208 gram.                      | 42.3 per cent.  | 100 0                       |
| 0.05 "        | 0.1209 "                          | 42.4 "          | 100.2                       |
| 0.10 "        | 0.1215 "                          | 42.6 "          | 100.7                       |
| 0.25 "        | 0.1234 "                          | 43.2 "          | 102.1                       |
| 0.50 "        | 0.1190 "                          | 41.7 "          | 98.5                        |
| 1.00 "        | 0.1130 "                          | 39.7 "          | 93.8                        |

### ISOBUTYL ALCOHOL.

#### *Experiment 134.* (Saliva 1:4.)

| Isobutyl alcohol. | Reduced copper in $\frac{1}{4}$ . | Maltose formed. | Relative amylolytic action. |
|-------------------|-----------------------------------|-----------------|-----------------------------|
| 0 per cent.       | 0.1137 gram.                      | 39.8 per cent.  | 100.0                       |
| 0.05 "            | 0.1122 "                          | 39.3 "          | 98.7                        |
| 0.10 "            | 0.1139 "                          | 39.9 "          | 100.2                       |
| 0.25 "            | 0.1152 "                          | 40.4 "          | 101.5                       |
| 0.50 "            | 0.1119 "                          | 39.2 "          | 98.4                        |
| 1.00 "            | 0.1161 "                          | 40.7 "          | 102.2                       |

<sup>1</sup> These experiments were carried out in our laboratory by Philip Dowell, B.A., Ph.B.

## PROPYL ALCOHOL.

*Experiment 135.* (Saliva 1:4.)

| Propyl alcohol.<br>0 per cent. | Reduced copper<br>in $\frac{1}{4}$ . | Maltose<br>formed. | Relative amyolytic<br>action. <sup>1</sup> |
|--------------------------------|--------------------------------------|--------------------|--------------------------------------------|
| 0.05 "                         | 0.1238 gram.                         | 43.4 per cent.     | 100.0                                      |
| 0.10 "                         | 0.1197 "                             | 42.0 "             | 96.7                                       |
| 0.25 "                         | 0.1288 "                             | 45.1 "             | 103.9                                      |
| 0.50 "                         | 0.1343 "                             | 47.0 "             | 108.2                                      |
| 1.00 "                         | 0.1254 "                             | 44.0 "             | 101.3                                      |

## METHYL ALCOHOL.

*Experiment 136.* (Saliva 1:4.)

| Methyl alcohol.<br>0 per cent. | Reduced copper<br>in $\frac{1}{4}$ . | Maltose<br>formed. | Relative amyolytic<br>action. |
|--------------------------------|--------------------------------------|--------------------|-------------------------------|
| 0.25 "                         | 0.0988 gram.                         | 34.6 per cent.     | 100.0                         |
| 0.50 "                         | 0.1005 "                             | 35.2 "             | 101.7                         |
| 1.00 "                         | 0.1040 "                             | 36.4 "             | 105.2                         |
| 2.00 "                         | 0.1130 "                             | 39.6 "             | 114.4                         |
| 5.00 "                         | 0.1042 "                             | 36.5 "             | 105.4                         |
|                                | 0.1067 "                             | 37.4 "             | 108.0                         |

These results make it clear that if whiskey or other distilled liquor should be contaminated with the above alcohols, their presence in any ordinary amount would not be prejudicial to salivary digestion. In fact, with the exception of amyl alcohol, these bodies, even in the largest percentages employed, tend to increase the amyolytic action of the saliva considerably above that of the control-mixture. Physiologically, this fact is of considerable interest, although it does not help explain the cause of the retardation in amyolytic action produced by whiskey, brandy, and the other liquors of this class.

## BRANDY (WITH 48 PER CENT. OF ALCOHOL).

*Experiment 137.* Saliva 1:20.

| Brandy.           | Appearance of the achromic point.                        |
|-------------------|----------------------------------------------------------|
| 0 per cent.       | 5 minutes.                                               |
| 0.5 " . . .       | 7 "                                                      |
| 1.0 " . . .       | 12 "                                                     |
| 2.0 " . . .       | 17 hours.                                                |
| 5.0 " . . .       | { no action beyond soluble starch<br>and erythrodextrin. |
| 10.0 " . . .      | no action whatever.                                      |
| Absolute alcohol. |                                                          |
| 5.0 per cent.     | 7 minutes.                                               |

<sup>1</sup> This result was lost through an accident, and consequently the action of the various percentages of alcohol must be compared with the action of the lowest percentage.



*Experiment 138.* (Saliva 1 : 4.)

| Brandy.     | Reduced copper<br>in $\frac{1}{6}$ . | Maltose<br>formed. | Relative amylolytic<br>action. |
|-------------|--------------------------------------|--------------------|--------------------------------|
| 0 per cent. | 0.113 gram. <sup>1</sup>             | 59.4 per cent.     | 100.0                          |
| 5    "      | 0.117   "                            | 61.5   "           | 103.5                          |
| 10   "      | 0.087   "                            | 45.7   "           | 76.9                           |
| 15   "      | 0.051   "                            | 26.8   "           | 45.1                           |

As with whiskey, brandy is wholly without deleterious action on salivary digestion when the saliva is not too greatly diluted and the brandy not present in quantities larger than 5 per cent. With saliva greatly diluted, on the other hand, even 1 per cent. of brandy is sufficient to cause retardation of amylolytic action. The alcohol of the brandy is in nowise responsible for the inhibitory action.

*Experiment 139.* (Saliva 1 : 20.)

| Fluid added.             | Appearance of the achromic point. |
|--------------------------|-----------------------------------|
| 0 per cent.              | 7 minutes.                        |
| 1   "    brandy          | 12   "                            |
| 1   "    "    neutral'd  | 7   "                             |
| 5   "    "               | no action beyond erythrodestrin.  |
| 5   "    "    "          | 16 hours.                         |
| 2.5   "   absol. alcohol | 7 minutes.                        |

*Experiment 140.* (Saliva 1 : 5.)

| Fluid added.            | Appearance of the achromic point. |
|-------------------------|-----------------------------------|
| 0 per cent.             | 2 minutes.                        |
| 5   "    brandy         | 12   "                            |
| 5   "    "    neutral'd | 2   "                             |
| 10   "    "    "        | 2   "                             |
| 5   "    absol. alcohol | 2   "                             |

Evidently, such retarding action as the brandy possesses is mainly connected with the acidity of the fluid, since on neutralization of the liquor its inhibitory action is greatly diminished or even entirely overcome. The following experiment shows that, as with whiskey, the non-volatile matter present in the liquor is not responsible for the retardation of amylolytic action, but has by itself a stimulating effect on amylolysis.

*Experiment 141.* (Saliva 1 : 4.)

| Brandy<br>residue. | Reduced copper<br>in $\frac{1}{6}$ . | Maltose<br>formed. | Relative amylolytic<br>action. |
|--------------------|--------------------------------------|--------------------|--------------------------------|
| 0 per cent.        | 0.113 gram. <sup>2</sup>             | 59.4 per cent.     | 100.0                          |
| 5   "              | 0.124   "                            | 65.2   "           | 109.7                          |
| 10   "             | 0.116   "                            | 61.0   "           | 102.7                          |
| 15   "             | 0.104   "                            | 54.7   "           | 92.0                           |

<sup>1</sup> With due allowance for such reducing action as the brandy itself possesses.

<sup>2</sup> With deduction for the reducing action of the sugar present in the brandy.

## RUM (WITH 51 PER CENT. OF ALCOHOL).

*Experiment 142.* (Saliva 1 : 20.)

| Rum.              | Appearance of the achromic point. |
|-------------------|-----------------------------------|
| 0 per cent.       | 11 minutes.                       |
| 0.5 "             | 35 "                              |
| 1.0 "             | 1.7 hours.                        |
| 2.0 "             | 24 "                              |
| 5.0 "             | no action beyond soluble starch.  |
| 10.0 "            | no action whatever.               |
| Absolute alcohol. |                                   |
| 5.0 per cent.     | 11 minutes.                       |

*Experiment 143.* (Saliva 1 : 4.)

| Rum.        | Reduced copper<br>in %.  | Maltose<br>formed. | Relative amylolytic<br>action. |
|-------------|--------------------------|--------------------|--------------------------------|
| 0 per cent. | 0.112 gram. <sup>1</sup> | 58.9 per cent.     | 100.0                          |
| 5 "         | 0.057 "                  | 30.0 "             | 50.8                           |
| 10 "        | 0.014 "                  | 7.3 "              | 12.3                           |
| 15 "        | 0.005 "                  | trace.             |                                |

It is to be noticed from these experiments that rum has a far greater retarding action on amylolysis than whiskey or brandy, even when the saliva is fairly concentrated. Further, the alcohol contained in the above percentage of brandy is entirely without influence on amylolytic action. This marked retarding action of rum is due mainly to volatile acid-reacting substances, presumably of the same nature as those present in whiskey and brandy, but present in larger amount. All samples of rum that we have examined have shown a decided acid reaction, considerably greater than we have found in whiskey or brandy, and to this we attribute the greater retarding action of this liquor. The following experiments attest the proof of this statement :

*Experiment 144.* (Saliva 1 : 20.)

| Fluid added.         | Appearance of the achromic point. |
|----------------------|-----------------------------------|
| 0 per cent.          | 7 minutes.                        |
| 1 " rum              | 3 hours.                          |
| 1 " " neutralized    | 7 minutes.                        |
| 5 " "                | no action beyond erythrodextrin.  |
| 5 " "                | 7 minutes.                        |
| 2.5 " absol. alcohol | 7 "                               |

<sup>1</sup> Making allowance for the reducing action of the rum itself.

*Experiment 145.* (Saliva 1 : 10.)

| Fluid added.               | Appearance of the achromic point. |
|----------------------------|-----------------------------------|
| 0 per cent.                | 3 minutes.                        |
| 5    "    rum              | 16 hours.                         |
| 10   "    "                | no action beyond erythrodextrin.  |
| 10   "    "    neutralized | 3 minutes.                        |
| 5    "    absol. alcohol   | 3    "                            |

Thus, simple neutralization of the acidity of the rum is all that is needed to overcome wholly the retarding action of this fluid on salivary digestion. Further, the following experiment made with the residue obtained by the evaporation of rum shows that this acidity is due to something volatilized by heat, since no trace of its action is to be found in the residue.

*Experiment 146.* (Saliva 1 : 4.)

| Rum residue. | Reduced copper in %.      | Maltose formed. | Relative amylolytic action. |
|--------------|---------------------------|-----------------|-----------------------------|
| 0 per cent.  | .0.119 gram. <sup>1</sup> | 62.5 per cent.  | 100.0                       |
| 5    "       | 0.119    "                | 62.5    "       | 100.0                       |
| 10   "       | 0.119    "                | 62.5    "       | 100.0                       |
| 15   "       | 0.116    "                | 60.7    "       | 97.1                        |

We may summarize our results with these strong alcoholic beverages as follows: Whiskey and brandy used dietetically, say to the extent of 5 per cent. in a digesting mixture, have no retarding influence upon the salivary digestion of farinaceous foods providing the saliva is not too greatly diluted. When present in larger quantities they exert a retarding action upon amylolysis which is out of all proportion to the contained alcohol. The inhibitory effect appears to be connected in part, and perhaps mainly, with acid-reacting substances more or less volatile or destructible in nature. Rum differs from the two preceding liquors in that it has a more marked retarding action; an action dependent chiefly upon the presence in larger quantity of these acid substances, and not connected with the amount of alcohol present.

## ACTION OF WINES.

Our study of the influence of wines on the salivary digestion of farinaceous foods shows that these fluids are extremely potent in checking the action of the salivary ferment. Further, this action is entirely unconnected with the alcohol present in the wines, but is dependent almost wholly upon their acid character. Indeed, it is safe to say that as a rule the retarding action of wines on amylolysis is practically propor-

<sup>1</sup> Allowance being made for the reducing action of the residue itself.



tional to the acidity of the fluid. On neutralization of these acid wines their retarding action on salivary digestion at once disappears, as the following experiments show:

SHERRY (WITH 21 PER CENT. OF ALCOHOL AND 4.7 PER CENT. OF SOLID MATTER).

*Experiment 147.* (Saliva 1:10.)

| Sherry.           | Appearance of the achromic point. |
|-------------------|-----------------------------------|
| 0 per cent.       | 2 minutes.                        |
| 0.5 "             | 17 hours.                         |
| 1.0 "             | no action beyond erythrodextrin.  |
| 2.0 "             | no action beyond soluble starch.  |
| 5.0 "             | no action whatever.               |
| Absolute alcohol. |                                   |
| 1.0 per cent.     | 2 minutes.                        |

*Experiment 148.* (Saliva 1:5.)

| Fluid added.      | Appearance of the achromic point. |
|-------------------|-----------------------------------|
| 0 per cent.       | 1 minute.                         |
| 1 " sherry        | 16 hours.                         |
| 1 " " neutralized | 1 minute.                         |
| 2 " " "           | no action beyond erythrodextrin.  |
| 2 " " "           | 1 minute.                         |
| 5 " " "           | no action whatever.               |
| 5 " " "           | 1 minute.                         |

CLARET (WITH 10 PER CENT. OF ALCOHOL AND 3.3 PER CENT. OF SOLID MATTER).

*Experiment 149.* (Saliva 1:15.)

| Claret.           | Appearance of the achromic point. |
|-------------------|-----------------------------------|
| 0 per cent.       | 7 minutes.                        |
| 0.5 "             | no action beyond erythrodextrin.  |
| 1.0 "             | no action whatever.               |
| 2.0 "             | " "                               |
| 5.0 "             | " "                               |
| 10.0 "            | " "                               |
| Absolute alcohol. |                                   |
| 1.0 per cent.     | 7 minutes.                        |

*Experiment 150.* (Saliva 1:10.)

| Claret.           | Appearance of the achromic point. |
|-------------------|-----------------------------------|
| 0 per cent.       | 2 minutes.                        |
| 0.5 "             | erythrodextrin stage.             |
| 1.0 "             | soluble starch only.              |
| 2.0 "             | no action whatever.               |
| 5.0 "             | " "                               |
| Absolute alcohol. |                                   |
| 0.5 per cent.     | 2 minutes.                        |

*Experiment 151. (Saliva 1 : 15.)*

|                        |                                   |
|------------------------|-----------------------------------|
| Fluid added.           | Appearance of the achromic point. |
| 0 per cent.            | 3 minutes.                        |
| 1 " claret             | soluble starch only.              |
| 1 " " neutralized      | 3 minutes.                        |
| 5 " "                  | no action whatever.               |
| 5 " " neutralized      | 3 minutes.                        |
| 0.5 " absolute alcohol | 3 "                               |

*Experiment 152. (Saliva 1 : 3.)*

|                   |                                   |
|-------------------|-----------------------------------|
| Fluid added.      | Appearance of the achromic point. |
| 0 per cent.       | 1 minute.                         |
| 1 " claret        | 4 $\frac{2}{3}$ hours.            |
| 2 " "             | no action beyond erythrodextrin.  |
| 5 " "             | no action whatever.               |
| 5 " " neutralized | 1 minute.                         |

## HOCHHEIMER (WITH 11 PER CENT. OF ALCOHOL AND 1.8 PER CENT. OF SOLID MATTER).

*Experiment 153. (Saliva 1 : 20.)*

|                   |                                   |
|-------------------|-----------------------------------|
| Hochheimer.       | Appearance of the achromic point. |
| 0 per cent.       | 8 minutes.                        |
| 0.5 "             | erythrodextrin stage.             |
| 1.0 "             | soluble starch.                   |
| 2.0 "             | no action whatever.               |
| 5.0 "             | " "                               |
| 10.0 "            | " "                               |
| Absolute alcohol. |                                   |
| 1.0 per cent.     | 8 minutes.                        |

*Experiment 154. (Saliva 1 : 15.)*

|                   |                                   |
|-------------------|-----------------------------------|
| Hochheimer.       | Appearance of the achromic point. |
| 0 per cent.       | 6 minutes.                        |
| 0.5 "             | erythrodextrin stage.             |
| 1.0 "             | soluble starch only.              |
| 2.0 "             | no action whatever.               |
| 5.0 "             | " "                               |
| 10.0 "            | " "                               |
| Absolute alcohol. |                                   |
| 1.0 per cent.     | 6 minutes.                        |

*Experiment 155.*

| Hochheimer.       | Appearance of the achromic point. |                      |
|-------------------|-----------------------------------|----------------------|
|                   | Saliva 1 : 10.                    | Saliva 1 : 5.        |
| 0 per cent.       | 3 minutes.                        | 2 minutes.           |
| 0.5 "             | erythrodextrin and sugar.         | 16 hours.            |
| 1.0 "             | no action beyond erythrodextrin.  | 16 "                 |
| 2.0 "             | soluble starch.                   | erythrodextrin only. |
| 5.0 "             | no action whatever.               | soluble starch.      |
| Absolute alcohol. |                                   |                      |
| 1.0 per cent.     | 3 minutes.                        | 2 minutes.           |

*Experiment 156. (Saliva 1 : 15.)*

| Fluid added.           | Appearance of the achromic point. |
|------------------------|-----------------------------------|
| 0 per cent.            | 5 minutes.                        |
| 1 " hochheimer         | no action beyond erythrodextrin.  |
| 1 " " neutralized      | 4 minutes.                        |
| 5 " "                  | no action whatever.               |
| 5 " " neutralized      | 4 minutes.                        |
| 0.5 " absolute alcohol | 5 "                               |

*Experiment 157. (Saliva 1 : 3.)*

| Fluid added.      | Appearance of the achromic point.   |
|-------------------|-------------------------------------|
| 0 per cent.       | 1 minute.                           |
| 1 " hochheimer    | 27 minutes.                         |
| 2 " "             | erythrodextrin stage.               |
| 5 " "             | soluble starch with erythrodextrin. |
| 5 " " neutralized | 1 minute.                           |

In conclusion, we may quote the words of Sir William Roberts,<sup>1</sup> whose views on this subject are in close harmony with our results: "Both the stronger and the lighter wines show a powerful inhibitory effect on salivary digestion. Even so small a proportion as 1 per cent. of sherry or hock was found to paralyze saliva almost completely, and even one-half or one-quarter of this proportion delayed the achromatic point appreciably. Claret and port wine behaved similarly. The inhibitory effect of wines is entirely due to the very considerable degree of acidity which they all possess. . . . When the acidity of wines is neutralized they lose entirely their inhibitory effect on salivary digestion."

## ACTION OF MALT LIQUORS.

Under the head of malt liquors we have experimented with essentially the same beverages as were described under gastric digestion, viz., porter, stout, lager beer, and ale, the same brands likewise being employed.

## PORTER.

*Experiment 158.*

| Porter.           | Appearance of the achromic point.  |                      |
|-------------------|------------------------------------|----------------------|
|                   | Saliva 1 : 20.                     | Saliva 1 : 10.       |
| 0 per cent.       | 11 minutes.                        | 3 minutes.           |
| 0.5 "             | 79 "                               | 18 "                 |
| 1.0 "             | 22 hours.                          | 74 "                 |
| 2.0 "             | erythrodextrin only.               | 174 "                |
| 5.0 "             | soluble starch and erythrodextrin. | 25 hours.            |
| 10.0 "            | soluble starch only.               | erythrodextrin only. |
| Absolute alcohol. |                                    |                      |
| 0.5 per cent.     | 11 minutes.                        | 3 minutes.           |

<sup>1</sup> Digestion and Diet, page 117.



*Experiment 159. (Saliva 1 : 10.)*

| Porter.                 | Appearance of the achromic point. |
|-------------------------|-----------------------------------|
| 0 per cent.             | 3 minutes.                        |
| 1 " "                   | 23 "                              |
| 1 " heated <sup>1</sup> | 23 "                              |
| 2 " "                   | 103 "                             |
| 2 " heated              | 103 "                             |
| Absolute alcohol.       |                                   |
| 0.5 per cent.           | 3 "                               |

*Experiment 160.*

| Porter.           | Appearance of the achromic point. |                |
|-------------------|-----------------------------------|----------------|
|                   | Saliva 1 : 10.                    | Saliva 1 : 15. |
| 0 per cent.       | 2 minutes.                        | 4 minutes.     |
| 1 " "             | 15 "                              | 28 "           |
| 1 " neutralized   | 1 minute.                         | 3 "            |
| 2 " "             | 65 minutes.                       | 225 "          |
| 2 " "             | 1 minute.                         | 3 "            |
| Absolute alcohol. |                                   |                |
| 0.5 per cent.     | 2 minutes.                        | 4 "            |

*Experiment 161. (Saliva 1 : 5.)*

| Porter.           | Appearance of the achromic point. |
|-------------------|-----------------------------------|
| 0 per cent.       | 1 minute.                         |
| 2 " "             | 3 minutes.                        |
| 5 " "             | 31 "                              |
| 10 " "            | 195 "                             |
| 10 " neutralized  | 1 minute.                         |
| Absolute alcohol. |                                   |
| 0.5 per cent.     | 1 "                               |

From these results the conclusion is plain that porter retards the salivary digestion of farinaceous foods very greatly, but that the inhibition is due entirely to the acidity of the fluid, and not to the contained alcohol. Further, the acidity due to the dissolved carbonic acid is not connected with the inhibitory action, since the fluid freed from carbonic acid by heat produces the same retardation as the original fluid. It is likewise noticeable that porter has far less retarding action on salivary digestion than corresponding percentages of wine, owing presumably to the smaller content of acid-reacting bodies. Again, there is a suggestion in the case of neutralized porter (Experiment 160) of a slight stimulation of amylolytic action, due presumably to the presence of the various extractives.

<sup>1</sup> Porter which had been previously heated with an inverted condenser in a water-bath for two hours. The carbonic acid is thus driven off, while the alcohol and other volatile matters condense and flow back into the fluid, the volume remaining constant.

## LAGER BEER (NEW HAVEN KEG BEER).

*Experiment 162.* (Saliva 1 : 25.)

| Beer.             | Appearance of the achromic point. |
|-------------------|-----------------------------------|
| 0 per cent.       | 15 minutes.                       |
| 0.5 "             | 20 "                              |
| 1.0 "             | 37 "                              |
| 2.0 "             | 45 "                              |
| 5.0 "             | 138 "                             |
| 10.0 "            | 175 "                             |
| Absolute alcohol. |                                   |
| 0.5 per cent.     | 15 "                              |

*Experiment 163.* (Saliva 1 : 20.)

| Beer.       | Appearance of the achromic point. |
|-------------|-----------------------------------|
| 0 per cent. | 9 minutes.                        |
| 5 "         | 77 "                              |
| 10 "        | 147 "                             |
| 15 "        | 147 "                             |
| 20 "        | 167 "                             |

*Experiment 164.* (Saliva 1 : 25.)

| Beer.                   | Appearance of the achromic point. |
|-------------------------|-----------------------------------|
| 0 per cent.             | 18 minutes.                       |
| 1 "                     | 36 "                              |
| 1 " heated <sup>1</sup> | 20 "                              |
| 2 "                     | 54 "                              |
| 2 " heated              | 36 "                              |
| Absolute alcohol.       |                                   |
| 0.5 per cent.           | 18 "                              |

*Experiment 165.* (Saliva 1 : 25.)

| Beer.                      | Appearance of the achromic point. |
|----------------------------|-----------------------------------|
| 0 per cent.                | 24 minutes.                       |
| 1 "                        | 50 "                              |
| 1 " heated and neutralized | 10 "                              |
| 2 "                        | 65 "                              |
| 2 " " " "                  | 10 "                              |
| 5 "                        | 80 "                              |
| 5 " " " "                  | 10 "                              |

From these results it is seen that the inhibitory action on salivary digestion of this sample of lager beer is considerably less than that of porter. Further, as in porter, such retardation as the beer causes is due wholly to the acidity of the fluid. Indeed, it is to be noticed that the neutralized beer tends to increase very decidedly the rate of amylolytic action. This is so marked as to suggest the possibility of the beer itself having an amylolytic action, although it can hardly be supposed that any amylolytic ferment present in the beer could resist the destructive

<sup>1</sup> Previously heated in the same manner as the porter in Experiment 159.

action of the heat applied to the fluid before it was neutralized. Careful experiments, however, with the fresh beer failed to show any amylolytic action on the part of the fluid itself; so that we are forced to the conclusion that the beer possesses a twofold action on amylolysis. The stronger action due to the acidity of the fluid is a retarding one, but when this is overcome by neutralization of the fluid, then the second action asserts itself, viz., a stimulation of salivary digestion due to some of the extractive matters of the beer. The alcohol present in the fluid is practically without action on the solvent power of the saliva on farinaceous foods. Unlike the experiments with porter, simply heating the beer (see Experiment 164) on a water-bath with an inverted condenser, so as to drive off the contained carbonic acid, tends to decrease the retarding action of the beer. This fact is hardly attributable to the loss of carbonic acid, certainly not wholly, and is perhaps due to some more profound change, since it was observed that the fluid tended to change its appearance with formation of a flocculent precipitate, etc.

## MILWAUKEE LAGER BEER (PABST'S).

*Experiment 166.* (Saliva 1 : 25.)

| Beer.             | Appearance of the achromic point. |
|-------------------|-----------------------------------|
| 0 per cent.       | 10 minutes.                       |
| 0.5 "             | 17 "                              |
| 1.0 "             | 30 "                              |
| 2.0 "             | 75 "                              |
| 5.0 "             | 140 "                             |
| 10.0 "            | 160 "                             |
| Absolute alcohol. |                                   |
| 0.5 per cent.     | 10 "                              |

*Experiment 167.* (Saliva 1 : 25.)

| Beer.                     | Appearance of the achromic point. |
|---------------------------|-----------------------------------|
| 0 per cent.               | 10 minutes.                       |
| 1.0 "                     | 35 "                              |
| 1.0 " heated <sup>1</sup> | 14 "                              |
| 2.0 "                     | 75 "                              |
| 2.0 " heated              | 35 "                              |
| Absolute alcohol.         |                                   |
| 0.5 per cent.             | 10 "                              |

*Experiment 168.* (Saliva 1 : 25.)

| Beer.                      | Appearance of the achromic point. |
|----------------------------|-----------------------------------|
| 0 per cent.                | 15 minutes.                       |
| 1 "                        | 22 "                              |
| 1 " heated and neutralized | 10 "                              |
| 2 "                        | 50 "                              |
| 2 " " "                    | 10 "                              |
| 5 " " "                    | 60 "                              |
| 5 " " "                    | 10 "                              |

<sup>1</sup> Previously heated in the same manner as the porter and beer in the preceding experiments.



*Experiment 169.*

| Beer.       | Appearance of the achromic point. |                               |
|-------------|-----------------------------------|-------------------------------|
|             | Saliva 1 : 25.<br>15 minutes.     | Saliva 1 : 15.<br>12 minutes. |
| 0 per cent. |                                   |                               |
| 30 "        | 180 "                             | 105 "                         |

The above results are practically confirmatory of the results obtained with New Haven beer, and we may derive from them the same conclusions as have already been drawn in connection with the preceding sample.

## ALE (BASS &amp; Co.'s PALE ALE).

*Experiment 170.*

| Ale.              | Appearance of the achromic point. |                              |                              |
|-------------------|-----------------------------------|------------------------------|------------------------------|
|                   | Saliva 1 : 20.<br>9 minutes.      | Saliva 1 : 15.<br>5 minutes. | Saliva 1 : 10.<br>2 minutes. |
| 0 per cent.       |                                   |                              |                              |
| 0.5 "             | 19 "                              | 7 "                          | 3 "                          |
| 1.0 "             | 43 "                              | 25 "                         | 4 "                          |
| 2.0 "             | 200 "                             | 75 "                         | 7 "                          |
| 5.0 "             | 260 "                             | 195 "                        | 46 "                         |
| 10.0 "            | 320 "                             | 255 "                        | 64 "                         |
| Absolute alcohol. |                                   |                              |                              |
| 0.5 per cent.     | 9 "                               | —                            | —                            |

*Experiment 171. (Saliva 1 : 15.)*

| Ale.                    | Appearance of the achromic point |  |
|-------------------------|----------------------------------|--|
|                         | 6 minutes.                       |  |
| 0 per cent.             |                                  |  |
| 1 "                     | 16 "                             |  |
| 1 " heated <sup>1</sup> | 14 "                             |  |
| 2 "                     | 54 "                             |  |
| 2 " heated              | 45 "                             |  |
| Absolute alcohol.       |                                  |  |
| 0.5 per cent.           | 6 "                              |  |

*Experiment 172.*

| Ale.                       | Appearance of the achromic point. |                              |
|----------------------------|-----------------------------------|------------------------------|
|                            | Saliva 1 : 15.<br>5 minutes.      | Saliva 1 : 20.<br>6 minutes. |
| 0 per cent.                |                                   |                              |
| 1 "                        | 19 "                              | 35 "                         |
| 1 " heated and neutralized | 3 "                               | 3 "                          |
| 2 "                        | 92 "                              | 140 "                        |
| 2 " " "                    | 3 "                               | 3 "                          |
| 5 "                        | 177 "                             | 245 "                        |
| 5 " " "                    | 3 "                               | 3 "                          |

<sup>1</sup> Ale which had been previously heated in a water-bath with inverted condenser, more especially for the removal of the carbonic acid.

*Experiment 173.*

| Ale.        | Appearance of the achromic point. |                |
|-------------|-----------------------------------|----------------|
|             | Saliva 1 : 15.                    | Saliva 1 : 10. |
| 0 per cent. | 5 minutes.                        | 3 minutes.     |
| 30    "     | 295    "                          | 115    "       |

## STOUT (GUINNESS'S EXTRA STOUT, DUBLIN).

*Experiment 174.*

| Stout.            | Appearance of the achromic point.         |                                           |               |
|-------------------|-------------------------------------------|-------------------------------------------|---------------|
|                   | Saliva 1 : 15.                            | Saliva 1 : 10.                            | Saliva 1 : 5. |
| 0 per cent.       | 4 minutes.                                | 4 minutes.                                | 3 minutes.    |
| 0.5   "           | 10½ hours.                                | 14   "                                    | —             |
| 1.0   "           | 22   "                                    | 4½ hours.                                 | 5 minutes.    |
| 2.0   "           | erythrodextrin.                           | erythrodextrin.                           | 20   "        |
| 5.0   "           | { erythrodextrin and<br>soluble starch. } | { erythrodextrin and<br>soluble starch. } | 6½ hours.     |
| 10.0   "          | soluble starch only.                      | soluble starch only.                      | 24   "        |
| Absolute alcohol. |                                           |                                           |               |
| 0.5 per cent.     | 4 minutes.                                | —                                         | —             |
| 1.0   "           | —                                         | —                                         | 3 minutes.    |

*Experiment 175. (Saliva 1 : 10.)*

| Stout.            | Appearance of the achromic point. |
|-------------------|-----------------------------------|
| 0 per cent.       | 3 minutes.                        |
| 1   "             | 300   "                           |
| 1   "   heated    | 161   "                           |
| 2   "             | 20 hours.                         |
| 2   "   heated    | 20   "                            |
| Absolute alcohol. |                                   |
| 0.5 per cent.     | 3 minutes.                        |

*Experiment 176. (Saliva 1 : 10.)*

| Stout.                         | Appearance of the achromic point. |
|--------------------------------|-----------------------------------|
| 0 per cent.                    | 2 minutes.                        |
| 1   "                          | 83   "                            |
| 1   "   heated and neutralized | 2   "                             |
| 2   "                          | 415   "                           |
| 2   "   "   "                  | 2   "                             |
| Absolute alcohol.              |                                   |
| 0.5 per cent.                  | 2   "                             |

*Experiment 177. (Saliva 1 : 5.)*

| Stout.                          | Appearance of the achromic point. |
|---------------------------------|-----------------------------------|
| 0 per cent.                     | 2 minutes.                        |
| 10   "                          | 24 hours.                         |
| 10   "   heated and neutralized | 2 minutes.                        |
| Absolute alcohol.               |                                   |
| 1.0 per cent.                   | 2   "                             |

Stout differs from the other malt liquors examined only in that its retarding action on salivary digestion is a trifle more pronounced, due, we think, solely to its somewhat greater acidity. Acidity is the keynote to the cause of the retarding action of malt liquors in general on salivary digestion. Remove the acidity of the fluid and we remove the disturbing factor; indeed, the neutralized malt liquors even stimulate digestion in some instances.

Thus, we find beer and ale more favorable to salivary digestion than porter and stout, simply because the former, as a rule, contain less acid than the latter. In our experiments we found stout to have an acidity two and even three times that of ordinary lager beer, and twice that of ale, while porter had an acidity somewhat less than that of stout, but twice that of beer and ale.

For example, samples of the above malt liquors showed the following relative acidity, expressed by the number of cubic centimetres of a 0.2 per cent. solution of KOH required to neutralize 25 c.c. of the respective fluids:

|                        |                            |
|------------------------|----------------------------|
| 25 c.c. stout required | 46.0 c.c. alkali solution. |
| 25 " porter "          | 34.0 " " "                 |
| 25 " ale "             | 19.0 " " "                 |
| 25 " beer "            | 10-17 " " "                |

Sir William Roberts, who has also made a study of this matter, says: "Malt liquors were found to hamper salivary digestion exactly in proportion to their degree of acidity. Sound English beers have not nearly so much acidity as wines, and they interfere comparatively little with the digestion of starch; but 'turned' beer is highly inhibitory."

In concluding this chapter of our work we may again emphasize the following facts: Alcohol, even when present in considerable quantities, has no marked effect upon the amylolytic or starch-digesting power of the saliva. Alcoholic beverages, however, do have a retarding action upon amylolysis, the extent of retardation varying with the strength of the saliva. Obviously, the retardation cannot be attributed to the alcohol present. Our results, indeed, show that the detrimental factor is, in most cases, the acidity of the fluid, for after neutralization of the alcoholic liquid no marked embarrassment of amylolytic action is to be observed. Occasionally, as with whiskey, neutralization of the fluid is not followed by a complete withdrawal of inhibitory action, hence in this case we are forced to attribute the retarding action of this liquor in part to the presence of some ethereal compounds such as are frequently found in small quantity in the stronger alcoholic liquors. Wines, in virtue of their greater acidity, have a far more pronounced retarding action upon salivary digestion than the stronger alcoholic fluids, and, as might be expected, the extent of retardation caused by a given wine is



dependent solely upon its degree of acidity. Wines which have been neutralized are practically without influence upon salivary digestion.

Malt liquors, likewise, owe such retarding action as they possess mainly, if not wholly, to the presence of acid or of acid-reacting bodies. Consequently, we may conclude that the retardation of salivary digestion caused by ordinary alcoholic drinks is in character similar to the retardation which follows the use of vinegar, lemon-juice, or other acid fluids or mixtures, such as salads highly seasoned with vinegar, etc., the only difference being that the latter class are unquestionably more vigorous in their retarding action from their greater degree of acidity. We may, indeed, query whether under normal circumstances in the body the retarding action of all these fluids, alcoholic or otherwise, is quite as great as our experiments would at first glance indicate. It must not be overlooked that the saliva is ordinarily alkaline, the degree of alkalinity in some cases, at least, being equal to 0.08 per cent. of sodium carbonate. With such an alkaline fluid, aided, perhaps, by alkaline food, a portion at least of the disturbing acid of the alcoholic beverage, especially if the latter is not imbibed in too large quantity, may be neutralized and thus deterred from exercising any deleterious influence. Further, the widespread use of effervescent table waters, such as Apollinaris water and others charged with alkaline carbonates, as additions to wines of the claret and hock type, would likewise lead to a diminution of the danger in this direction. On the other hand, the acid alcoholic beverages, especially the sour wines and other liquors with pronounced acid reaction, must always be a menace to the thorough and vigorous digestion of farinaceous foods both by the saliva and pancreatic juice, provided the latter is exposed to their influence. This, obviously, may be a matter of little moment to a vigorous person with abundant digestive resources, but to the weak and ailing individual with scant digestive powers it may be a matter of vital importance.

#### SUMMARY.

The following summary, in which will be found many repetitions of previous statements, will suffice to make clear the general tenor of our results:

Pure ethyl alcohol, the active agent in all so-called alcoholic liquors, when present in small amount—say 1 or 2 per cent. of absolute alcohol, equal approximately to 2 to 4 per cent. of proof-spirit—has little or no action upon the digestive power of the gastric juice. There is, indeed, a slight tendency for such amounts of alcohol to increase somewhat the proteolytic power of the enzyme—in other words, the digestive power on proteid foods may be slightly increased. As the percentage of alcohol is raised, retardation or inhibition of proteolytic action becomes pronounced, although not very marked until the digesting mixture contains

5 to 10 per cent. or more of absolute alcohol. With 15 to 18 per cent. of absolute alcohol, digestive action may be reduced one-quarter or even one-third. Especially important is the fact that the extent of retardation by a given percentage of alcohol varies greatly with the strength or activity of the gastric juice and with the digestibility of the proteid material. Everything else being equal, the greater the strength or digestive power of the gastric juice the less is the retardation, while, on the other hand, the weaker the gastric juice the greater the inhibitory action of a given amount of absolute alcohol. It is, therefore, impossible to make a general specific statement regarding the action of given percentages of alcohol under all conditions. Our results agree essentially with those obtained by Sir William Roberts, who found that in the presence of less than 10 per cent. of proof-spirit (5 per cent. of absolute alcohol) there was no appreciable retardation of gastric digestion. With 10 per cent. of proof spirit retardation was only barely detectable, while with 20 per cent. retardation was quite distinct. Beyond this point the inhibitory effect of alcohol increased rapidly.

On the proteolytic action of the pancreatic juice absolute alcohol exercises a more marked influence, the presence of even 2 or 3 per cent. being sufficient to produce a distinct retardation of digestive action. Still, as in the case with gastric digestion, the exact amount of retardation is greatly dependent upon the digestive power of the pancreatic fluid. When the amount of absolute alcohol present in the digesting mixture is less than 1 per cent. the inhibition of proteolytic action is very slight, provided the ferment is fairly vigorous in its action.

On the digestion of farinaceous foods by the saliva absolute alcohol has no very marked influence. With active saliva not greatly diluted the presence of even 5 per cent. of absolute alcohol may lead to a slight increase in digestive power. Larger quantities of alcohol cause retardation of amylolytic action, but even 10 per cent. of absolute alcohol causes only a slight retardation. As this percentage of absolute alcohol is equal to at least 20 per cent. of proof-spirit, it follows that pure alcohol, free from admixture, is not liable to interfere materially with the digestion of starchy foods by the saliva nor presumably by the pancreatic juice.

Strong alcoholic beverages, such as whiskey, brandy, rum, and gin, containing ordinarily about 50 per cent. of absolute alcohol and with only a small amount of solid or extractive matter, have an action upon gastric digestion practically proportional to the quantity of alcohol present. Thus, with a vigorous gastric juice, the presence of even 10 per cent. of whiskey results simply in a slight retardation of digestive action. The same is true of brandy, gin, and rum. With a weak gastric juice the retarding action is much greater. When digestive action is fairly vigorous the presence of small percentages of whiskey causes practically no retardation; indeed, there is even a slight sugges-

tion of increased digestive action in the presence of 3 per cent. of whiskey, much the same as was observed in the experiments with absolute alcohol. In the presence of 20 per cent. of whiskey, on the other hand, digestive activity may be reduced one-fourth, and when the gastric juice is very weak from scarcity of the active ferment, then even small amounts of whiskey may exercise a very marked retarding effect upon the digestive process. Such retardation of gastric digestion as whiskey, brandy, gin, and rum produce is connected mainly with the presence of alcohol or other volatile matter contained in the liquor, the solid matter present in the fluid not showing, as a rule, any evidence of responsibility for the inhibitory action. The conclusion is obvious that pure whiskey, brandy, rum, and gin are no more deleterious to gastric digestion than corresponding strengths of absolute alcohol, and, further, that in the healthy individual these liquors can be considered to impede the gastric digestion of proteid foods only when taken immoderately and in intoxicating doses.

With reference to the composition of whiskey as bearing upon possible variations in the action of this fluid on gastric digestion, our results show merely a variation in the percentage of alcohol present, suggestive of more or less addition of water. The few results obtained by us in this direction show variations in the percentage of alcohol ranging from 30 to 50 per cent. There was likewise some variation in the quantity of tannin present, but in no case was the amount of the latter large.

As to so-called fusel oils, our results show that the higher alcohols, supposedly contained in such oils in small quantities, tend to increase rather than decrease the proteolytic action of the gastric juice. Thus, methyl, propyl, isobutyl, and amyl alcohols all increase somewhat the digestive power of the gastric juice when present in small amount. Large quantities have a decided inhibitory action. Plainly, however, if these alcohols are common impurities in whiskies, brandies, and related liquors, they do not exercise any deleterious influence upon the proteolytic action of the gastric juice.

On pancreatic digestion whiskey is quite active. The sensitiveness of the pancreatic ferment to this form of alcoholic liquor is quite marked. Further, the retarding action of a given percentage of whiskey is greater than that of a corresponding percentage of pure alcohol, thus indicating the presence of an additional inhibitory substance which is apparently a part of the solid matter of the whiskey and is undoubtedly connected with the acidity of the fluid. Brandy and rum have essentially the same action upon pancreatic digestion as whiskey. Both retard proteolysis quite noticeably, and with both fluids the retardation is somewhat greater than that caused by a corresponding strength of alcohol.

The higher alcohols, such as are present in fusel oils, have a somewhat greater inhibitory action upon pancreatic digestion, *i. e.*, trypsin-proteol-



ysis, than ethyl alcohol; but when it is remembered that these alcohols can be present in whiskey, brandy, etc., only in very small quantities, it is seen that they can exercise very little influence in modifying the action of alcoholic liquors upon pancreatic proteolysis.

On the digestion of farinaceous foods by the saliva whiskey and brandy have no retarding influence when present to the extent of 5 per cent., provided the saliva is not too greatly diluted. Present in larger quantities, or when mixed with weak or greatly diluted saliva, they exert a retarding influence upon amylolytic action which is out of all proportion to the contained alcohol. The inhibitory action is connected mainly with the acidity of the alcoholic fluid, for on neutralization of this acidity the inhibitory action of the liquor ceases. Rum differs from whiskey and brandy in having a somewhat greater inhibitory action, due simply to the greater acidity of this fluid, and is nowise connected with the alcohol present.

The heavier alcohols, viz., amyl, butyl, propyl, etc., all tend to increase the amylolytic action of the saliva when present in small quantity.

Wines, as a class, when present in small amount, have little or no deleterious action upon the chemical processes of gastric digestion. In small amount they may even increase somewhat the rate of digestive action. In larger quantities they have more or less of a retarding effect, which is dependent more upon the character and amount of the solid matter present than upon the contained alcohol. Thus with wines containing 10 per cent. of alcohol the alcohol is of minor importance so far as the influence of the fluid upon the solvent or digestive power of the gastric juice is concerned.

On pancreatic digestion wines have a far greater inhibitory action than the stronger alcoholic liquors. This action, under ordinary circumstances, is almost entirely independent of the content of alcohol, and is very closely connected with the acidity of the fluid. Thus, a strongly acid wine, like a claret with only 10 per cent. of alcohol, has a far greater retarding action on trypsin-proteolysis than a sherry with twice that content of alcohol, but with less acidity.

On salivary digestion wines as a class show a very powerful inhibitory effect, an effect which is due almost entirely to their acid properties. Thus, when the acidity of a wine is neutralized, it loses completely its inhibitory effect on salivary digestion.

Malt liquors in small quantities are without any marked influence on the digestive power of the gastric juice. In larger quantities they cause an inhibition of proteolysis which is entirely unconnected with the small amounts of alcohol present, but directly traceable to the comparatively large amounts of extractives they contain.

On pancreatic digestion the malt liquors as a class exert an inhibitory effect which, however, is not very pronounced. The retarding action is



due mainly to the character of the solid or extractive matters present in the liquors, and is practically unconnected with the content of alcohol. The inhibitory action of malt liquors is far less pronounced than that of wines.

On salivary digestion malt liquors have a very great retarding effect, especially when the saliva is quite dilute. With saliva less diluted the retarding action is far less pronounced. The inhibitory action of these liquors is due solely to their acidity. Remove the acidity by neutralization with an alkali and the inhibitory action disappears.

Finally, it is to be plainly understood that these conclusions apply solely to the influence of the various liquors studied upon the purely chemical processes of digestion—*i. e.*, upon amylolysis and proteolysis. The results recorded do not afford data for drawing any broad or general conclusions regarding the influence of alcoholic drinks upon digestion or alimentation, since they throw no light upon possible modifications of secretion, absorption, or peristalsis. We have now positive data regarding the action of alcohol and various alcoholic fluids upon the digestive action or solvent power of the saliva, gastric juice, and pancreatic juice, the three important digestive fluids of the body; but before we can answer the question, How do alcoholic fluids affect digestion? we must ascertain the influence of these fluids upon the secretion of the digestive juices and upon the absorption of the products of digestion, as well as upon peristalsis, and not until these points have been thoroughly studied shall we be able to understand fully the action of these beverages upon the whole process of digestion.

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## REVIEWS.

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SYSTEM OF SURGERY. Edited by FREDERIC S. DENNIS, M.D., Professor of the Principles and Practice of Surgery, Bellevue Hospital Medical College; Visiting Surgeon to the Bellevue and St. Vincent Hospitals; Consulting Surgeon to the Harlem Hospital and the Montefiore Home, New York; ex-President of the American Surgical Association; Graduate of the Royal College of Surgeons, London; Member of the German Congress of Surgeons, Berlin. Assisted by JOHN S. BILLINGS, M.D., LL.D. Edin. and Harv.; D.C.L. Oxon.; Deputy Surgeon-General U. S. A. Vol. III. Surgery of the Larynx, Tongue, Jaws, Teeth, Salivary Glands, Neck, and Chest. Diseases and Surgery of the Eye and Ear. Surgical Diseases of the Skin. Surgery of the Genito-Urinary System. Syphilis. New York and Philadelphia: Lea Bros. & Co., 1895.

THIS volume continues the valuable features of the excellent series, and maintains the high standard of its predecessors. Perhaps there is greater scope given to individual opinion in some sections than in others; but, notably in that portion devoted to Genito-urinary Surgery, where the fullest expression is given to personal views, very copious use is made of the work of others, with the addition of the ever-useful reference.

The absence of these references may be said to be the defect of the article on the Surgery of the Larynx and Trachea. Beginning with a brief mention of the simpler clinical conditions, the author, Dr. Delavan, proceeds to the discussion of those which more strictly concern the surgeon. The serious nature of many conditions of the larynx and trachea is not always recalled, and the gain through aseptic and antiseptic methods is not so striking as in some other portions of the body. Wounds of the trachea are more fatal than is often supposed. The death percentages given are 24 for large, 52 for small, and 40 for gunshot wounds.

The O'Dwyer tube is expected to play an important part in the future treatment of fracture, œdema, stricture, and perichondritis of the larynx. Intubation methods are clearly presented. Ten seconds is the time given for the whole procedure.

The tearing away piecemeal of nasal polyps is considered absolutely contraindicated. In the treatment of chronic hypertrophy of the tonsils the cutting operation is decidedly favored, contrary to the teaching of many authorities, who have discarded the tonsillotome.

Dr. Henry H. Mudd writes of the Surgery of the Mouth and Tongue. Under the head of epithelioma of the tongue it is remarked that the removal of a part or even of the entire tongue is not especially difficult nor dangerous, and the operation should be made earlier in order to improve the present rate of mortality and recurrence. A number of valuable tables represent the causes of death after operation, the percentage



of recurrence, its periods, and the like, in 583 cases. One suggestive table gives a much lower mortality for the knife or scissors than for the electro-cautery or the galvano-écraseur. In 51 deaths by acute post-operative infection the percentage is not materially influenced by the presumably antiseptic surgery since 1880.

An interesting chapter is devoted to the Salivary Glands.

The important surgical region of the Neck is considered, first from the standpoint of development, after which various injuries, diseases, and growths claim attention. The work deserves praise in that material is not duplicated where classification of general subjects is somewhat conflicting. It would add greatly to the convenience of reference were volume and page to be given instead of the annoying reference "elsewhere," though this is a defect common to works whose separate volumes are published at intervals.

In the chapter on Injuries and Diseases of the Chest, very careful attention is given to lesions which affect the thoracic contents. The occurrence of hemiplegia is noted from washing out the chest-cavity with cold fluids after aspiration. The results of pneumonotomy are considered very encouraging, considering the circumstances. The technique of the operation from behind for the removal of foreign bodies from the œsophagus and bronchi is reproduced in the words of a monograph by Dr. J. D. Bryant. His valuable diagrams are given.

The Diseases of the Eye are admirably presented by Dr. de Schweinitz, while the operative surgery of that organ has been assigned to Drs. Henry D. Noyes and John E. Weeks.

The Surgery of the Ear has advanced in interest since the importance and frequency of mastoid disease have been more fully recognized. Careful consideration is given to this subject and to brain-abscess. For the opening of the mastoid cells the chisel is advised.

Half the volume is occupied with the Genito-urinary System, comprising as full a consideration of this most important field as is contained in many special works. Dr. J. William White writes on the surgery proper and on gonorrhœa.

A pertinent subject is that of floating or movable kidney. Attention is called to the fact, often overlooked, that the true floating kidney is congenital, has a mesonephron, and lies within the peritoneal cavity. Extremely few cases have been recognized before death. A valuable discussion is given of the suppurative lesions in and about the kidney, with many references. Stress is laid upon the tendency of perinephritic abscess to travel upward, and many cases are referred to in which this has given rise to serious error or obscurity. Liberal use is made in the chapter on Ureteral Disease of the writings of Fenger and others who have contributed to the knowledge of this subject. The conclusions of this author are given in full. The status of the cystoscopic examination of the male bladder is intelligently presented. "It can be hardly said to have advanced the surgery of the bladder as far as might be at the first glance imagined. Beyond the early diagnosis of new growths the greatest service which the cystoscope can render to the surgeon is to demonstrate exactly the source of hæmaturia or pyuria when it is suspected that one of the kidneys is diseased." Its use "by untrained observers is both mischievous and misleading." The more favorable views of Meyer are also given. Not the least striking feature of the modern discussion of cystitis is the wholesome regard which the surgeon has come



to feel for the cleanliness of catheter and sound. The author regards nitrate of silver as the mainstay in the treatment of chronic cystitis.

Among operations for vesical calculus in children, litholapaxy is considered to be the best, perineal lithotomy having now a very limited field. So in later life litholapaxy is to be first thought of.

Barling's tables of operations between 1888 and 1892, as compared with Thompson's for the years between 1790 and 1840, show that the general mortality of stone-operations is reduced, and that the reduction is due to the greater safety at present after fifty years of age, but they "appear to show also unmistakably that operations for stone in children are attended with a greater mortality than they were fifty years ago." This is considered to be due to the suprapubic section.

The author advocates with a certain amount of partisan vigor the claims of castration for prostatic hypertrophy. His reiteration of the supposed analogy between this procedure and oöphorectomy for fibroid uterus seems hardly consistent with later knowledge of the behavior of uterine fibroids after removal of the ovaries, and of their growth after the menopause. It is because the results upon fibroids have been so unreliable and unsatisfactory that removal of the ovaries has been largely abandoned in favor of perfected methods of hysterectomy, particularly in America. The operation of orcheotomy must claim for itself better grounds than this analogy, which is superficial, after all. In the curative treatment of hydrocele of the tunica vaginalis, preference is given by the author to the iodine-injection method. In congenital hydrocele, however, radical operation is preferred.

The best prophylactic for gonorrhœal rheumatism is the employment of the urinary antiseptics, salol, boric acid, benzoic acid, and quinine.

In the article on Syphilis, Dr. R. W. Taylor places himself among those who believe that chancroids are in some cases simply septic ulcers.

He states that there is no specific virus, and the ulcer may be readily generated *de novo* at the will of the experimenter from various and the most different sources. Chancroids may occur in men from irritated simple erosions in women. "It must be clearly understood that chancroids may be found on the penis of a man, and that examination of the woman with whom he has cohabited may show her to be free from these lesions." He thinks that innocent women may be cruelly wronged by suspicion even when chancroidal ulcers have been contracted from them. "It is not very uncommon to see chancroids in men who have had no sexual exposure whatever" (page 891), due to dyscrasia, etc. Contagion through contact with objects is considered quite rare, however, though common in syphilis. The general treatment of the subject of venereal diseases is comprehensive and very satisfactory.

The present volume will increase the value of the series and will not be the one least frequently consulted by the physician. G. E. S.

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THE THEORY AND PRACTICE OF COUNTER-IRRITATION. By H. CAMERON GILLIES, M.D. Pp. xii. 236. London: Macmillan & Co., 1895.

WE cannot but admire the hardihood of an author who, in these days of seeking after strange therapeutic gods, has the patience and energy to search the medical past to learn what is said of an old practice in order

that a new theory shall be evolved, to the end that a rehabilitation of it shall be brought about. Equally do we admire the faith of the publishers that the much-perplexed practitioner will be so far interested in by-gone medical history that their venture shall be a profitable one. Yet with much that is new demanding our experiment and study to determine if it be true, we confess that we have become so much interested in this book that it has received a most careful perusal. We agree with the author, in his preface, when he says that he likes the plan of his essay very much, and we go still further than he in liking its execution still more. The plan is briefly a first part, Historical and Critical; the second, Practical—even more so than the average physician or surgeon would care to admit. In the first part we find much with which we are familiar, the theories, the conjectures of practitioners long since dead, and their authority equally dead so far as its influence upon the mind of the practitioner who lives in the elegant therapeutics of the present is concerned. The dust-covered shelves of the library have been ransacked, and in the main the statements are correct. We note one glaring exception. Granville's lotion (p. 29) was not kept a mystery, nor need we impute any unprofessional secrecy to his work, as does the author. As to what the lotion was we need only to refer to the *Medico-Chirurgical Review* of 1838—the same year in which appeared *Counter-irritation, its Principles*—vol. xxxiii. pp. 472 and 476. To the best of our knowledge a formula known as Granville's lotion has been in use in this country for more than half a century. We can, perhaps, find an explanation of the interest of the author in the old-time lore when we read the rather unnecessarily interjected diatribe against vivisection (pp. 76 *et seq.*). At times in his reasoning he lays himself open to the charge which he brings against others (*cf.* pp. 96 and 89). In regard to checked skin-diseases causing mischief (p. 97), we have held the opinion that such a statement indicated rather the inability of the practitioner to cure them. On pp. 107 *et seq.*, the new theory is presented. Irritants get a fuller supply of appropriate nourishment into a part by stimulating the local circulation and so accelerating nutrition, and on p. 125 begins a chapter devoted to the use of so-called counter-irritation. In all points the subject is clearly stated. We note inelegancies of expression—p. 34, "pile" apparently meaning an accumulation of wealth; p. 153, "albumins, sugars, and loads of other things appear in the urine,"—which should not be found in a scientific work. On the whole, we expect that the study of this book will bring about a re-introduction of an old, but at present neglected method of relief and cure, but with its limitations better defined and its possibilities well ascertained.

R. W. W.

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PREGNANCY, LABOR, AND THE PUERPERAL STATE. By EGBERT H. GRANDIN, M.D., Consulting Obstetric Surgeon to the New York Maternity Hospital; Consulting Gynecologist to the French Hospital, etc., and GEORGE W. JARMAN, M.D., Obstetric Surgeon to the New York Maternity Hospital, Gynecologist to the Cancer Hospital, etc. Illustrated with forty-one photographic plates. Philadelphia: The F. A. Davis Co. London: F. J. Rebman, 1895.

IN the present volume the writers conclude their discussion of Obstetrics, having previously written regarding Obstetric Operations in an

interesting volume already reviewed in this JOURNAL. The present book has been designed to deal with facts only, giving no space for the discussion of theories. There are no references to the literature of the subject, and the book is a personal expression of the beliefs of the writers. It is illustrated from photographs of patients, many of which are clear and interesting. The make-up of the book and the manner in which its illustrations are reproduced are not of the best; binding and type are not substantial and clear, while the authors' photographs have been reproduced in an indifferent manner. This is to be regretted, for the subject-matter of the book deserves a better dress.

The work naturally begins with the diagnosis of pregnancy, and here attention is rightly called to the fact that the most important positive sign of pregnancy is found in changes in the contour and consistence of the uterus. In examining patients, the writers have found it entirely unnecessary to uncover the abdomen, but have the patient lie quietly with the field of examination covered by a thin sheet. This has been our custom, and we are glad to find that others have experienced its convenience and its acceptability to patients. In computing the duration of pregnancy the writers very wisely call attention to the liability of error, and suggest that the date at which the uterus sinks is often a point of value in estimating the time of labor. In dealing with the pathology of pregnancy we do not find that importance laid upon impaction of the uterus in the pelvis—often the result of improper clothing—which our experience has impressed upon us. First in importance in the treatment of these cases is a thorough and careful vaginal examination to determine the presence or absence of abnormal positions of the uterus. We recall cases of marked anterior displacement of the pregnant womb in which posture was not sufficient, but in which reposition and the use of the wool pessary gave prompt relief. In treating of the toxæmia of pregnancy the writers lay more stress upon the renal condition than we think is justifiable. Too much stress, we think, is laid upon increase in the amount of albumin present, and too little upon measurement of the amount of urine passed and estimation of its urea and solids. The writers speak in no uncertain way regarding the treatment of ovarian cysts complicating pregnancy. So soon as diagnosed, these tumors should be removed. Placenta prævia is spoken of under the title of "Vicious Insertion of the Placenta." The writers' classification is exceedingly simple, but two varieties of attachment out of the normal being recognized. The writers believe in interfering in all threatening cases by emptying the uterus without having recourse to the tampon and the use of ergot. There is no question that in their hands the results of such procedure would be good. In the hands of the average practitioner who has intelligence enough to practise antisepsis we have seen success follow the use of the tampon.

The writers' classification of positions and presentations is original, but does not, we think, simplify the subject. We do not recognize the propriety of making several presentations of the vertex, for we do not see how there can be but one presentation of this portion of the fetus. The presenting part may occupy a number of positions, and this is what is evidently intended in the language of the writers. Under the head of what are usually spoken of as shoulder presentations, the writers speak of presentations of the trunk.

In treating of labor the writers speak of the fœtus as engaging in the



cavity of the pelvis. This description has a practical bearing when the indications for the use of forceps are considered. If the instrument is not to be applied, as is held by most obstetricians, until the head is engaged, and engagement takes place in the cavity of the pelvis, then the use of forceps when the head is within the pelvic brim, but has not descended into the cavity of the pelvis, can scarcely be justified. We doubt if this is the meaning of the writers, for the use of forceps is not uncommon when the head has engaged within the brim, and has not yet descended into the cavity of the pelvis. The writers' description of the abnormalities of labor is clear and interesting, and we note with pleasure the fact that abnormalities in labor are considered as variations from the normal mechanisms, and are not treated as separate varieties of labor.

The clinical course of labor is given in a very practical and thorough manner, and here again some of the most important complications are considered in connection with normal delivery. We are heartily in accord with the writers when they say that "labor should never be deemed completed until lesions are looked for by touch and inspection."

The section upon the management of labor is written wisely and well.

The value of anæsthetics, the choice of an anæsthetic, antiseptic precautions, are given with great clearness. During the first stage of labor, especially if prolonged, we do not allow a patient to drink and eat as she pleases, but prefer to have her take concentrated nourishment at regular intervals. The writers choose the dorsal position for delivery, and adopt a method of supporting the head, inserting, if necessary, the index-finger in the rectum. This procedure we have never found advantageous, preferring to place the patient upon the side, and supporting the head by the fingers passed between the mother's thighs and guarding the perineum by the palm and fingers of the right hand. We prefer, for many reasons, not to insert the finger into the rectum of a patient during labor. The writers do not favor twisting the membranes into a cord, a procedure which is generally found unnecessary. In checking post-partum hemorrhage the value of the intrauterine tampon is emphasized, and also the usefulness of strychnine by hypodermatic injection. Posterior rotations of the occiput are to be managed by manual correction under anæsthesia whenever possible. This is certainly the wisest course, and failing in this, as the book advises, the physician may hope for spontaneous rotation when the head reaches the pelvic floor. In dealing with face-presentations a similar advice is given. In delivering the after-coming head great stress is laid upon downward traction upon the shoulders, assisted by suprapubic pressure. If the occiput be brought well under the pubes, there will be little difficulty in delivering the face over the perineum and pelvic floor. Stress is laid upon the resuscitation of asphyxiated infants by flexing and extending the trunk of the child in a rhythmical manner. This and the Schultze method are considered the best of all. The treatment of the puerperal period enjoins careful antiseptic precautions, and allows the woman to sit up occasionally after the fourth day. The writers estimate the milk-plant of value in producing a free flow of milk, and recommend its use in strong infusions. In preparing a bottle for an artificially fed child, boiled milk is to be employed, with gelatin and arrow-root. To this cream is added. A pinch of salt is advised, or a little bicarbonate of soda. These directions are scarcely up to the general accuracy of the book, and we are surprised to find boiled milk recommended in the modern feeding of



infancy. The book treats in an excellent manner of puerperal septic infection. The directions and indications for the various forms of treatment are well and clearly given.

The indications for curetting, and the conditions under which curetting must not be done, are very plainly set forth. Puerperal insanity and puerperal tetanus are considered as varieties of infection.

The book is of a convenient size, and its entire absence of padding, its clear and reasonable statements, make it a work of value to the practitioner of obstetrics. There is always room for difference of opinion upon non-essential points, and a positively written book excites such differences in the mind of the reader. This we believe to be one of the good results which follow the reading of such a book, for such challenge the belief of the reader, and oblige him, if candid, to prove his faith in matters scientific. We have read this book with great pleasure, and prize highly this expression, in permanent form, of the skill and experience of its able writers.

E. P. D.

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MANUAL OF GYNECOLOGY. By HENRY T. BYFORD, M.D., Professor of Gynecology and Clinical Gynecology in the College of Physicians and Surgeons of Chicago; Professor of Clinical Gynecology in the Woman's Medical School of the Northwestern University; Professor of Gynecology in the Post-Graduate Medical School of Chicago. Containing two hundred and thirty-four illustrations, many of which are original. Pp. xii. 488. Philadelphia: P. Blakiston, Son & Co., 1895.

THE scope of this attractive little book is defined in the preface as being intended not only as a complete manual for the student, but also "an adequate exposition of the subject to the older general practitioner, who recognizes the impropriety of an attempt on his part to manage the more complicated cases, or to perform the more difficult operations belonging to gynecology." In order to accomplish this dual object the portions intended for the student are printed in larger type than the paragraphs intended for more advanced readers.

In glancing over the work we are impressed with two excellent features—the clearness and conciseness of the author's statements, and the fact that the book is not a mere compilation from larger works, which one usually expects in a manual at the present day, but represents the results of his own practical experience. Viewed in this light it deserves more than a passing notice. The six introductory chapters (Part I) furnish a good example of the large amount of useful information which can be compressed within a few pages by one who knows just what the student needs. The chapters on Gynecological Technic (we note with approval the first use of the correct substitute for the prevailing term "technique") are models of clearness and common sense, as well as Chapter VI., on the After-treatment of Operative Cases.

The arrangement of the subject-matter in the body of the work is somewhat different from that usually followed. Part II. treats of Anomalies of Development (including a short chapter on Chlorosis!); Part III. of Functional and Nervous Diseases (why "diseases"?); while the seven succeeding divisions are devoted to traumatic lesions, displacements,

inflammatory lesions, genital tuberculosis, malignant diseases, tumors of the female genital organs, and a concluding section on ectopic pregnancy and hæmatocele. This arrangement is sometimes a little confusing, and the transition from one topic to another necessarily abrupt; but, on the whole, it is novel, and, like other new things nowadays, correspondingly interesting. Seventy-two chapters are rather a liberal allowance for such a small volume, especially as some of them are less than a page in length; but it must be confessed that this arrangement, as well as the rigid subdivision of topics, is an advantage for purposes of recitation.

More attention is paid to hysteria and neurasthenia than is usual in even the larger text-books. The chapter on the latter subject contains an excellent *résumé* of the "rest-cure." The chapter on the Perineum includes brief but excellent descriptions of the typical operations. The operations for the repair of genital fistulæ are less satisfactory. In the last paragraph of the chapter on Laceration of the Cervix, confusion is introduced by reference to "Schroöder's modification of Emmet's operation." The two operations are entirely distinct, as well as their indications.

We are glad to note that antelexion is not regarded as a true displacement (though included under this heading), and that in this condition "pessaries are, as a rule, more harmful than beneficial."

Part VI. on Inflammatory Lesions (an unfortunate term) includes inflammation of the urinary tract. Cystotomy receives rather faint praise in the treatment of "chronic persistent cystitis."

The author's views on uterine pathology may be criticised by gynecologists of the more advanced school. Our old friend, "Areolar hyperplasia," presents its familiar face, and the recommendation on page 296, to cauterize the endometrium with chloride of zinc "in the more chronic cases," recalls the heroic age of gynecology.

The writer at least shows the courage of his convictions in retaining the chapter on pelvic cellulitis, which has become nearly obsolete in modern text-books. In the chapter on cancer of the cervix uteri there is a good working description of vaginal hysterectomy with clamps.

Part IX. is decidedly novel, as it treats of non-malignant tumors of the entire genital tract, malignant neoplasms not being regarded as "tumors." Undue prominence is given to the palliative treatment of uterine fibroids from the modern surgical standpoint, though doubtless this is of advantage to the practitioner.

The transition from cystic tumors of the external genitals to ovarian cystomata is somewhat abrupt, even in a purely clinical work. Varicose veins and condylomata are included under the general heading of "tumors." The association of papilloma of the external genitals, Fallopian tubes, and ovary might lead the inexperienced reader to infer that they were identical in their origin and pathological importance.

As we have before stated, the book represents the mature experience of an excellent clinical teacher, who knows what is best suited for the student and young practitioner. It is honest and conservative in its teaching, and while we cannot accept its pathology as being strictly up to date, from a clinical standpoint it presents many attractive features. The style is terse and clear, useless matter is rigidly excluded; in short, it combines the best features of a good working manual. H. C. C.

A MANUAL OF ORGANIC MATERIA MEDICA: BEING A GUIDE TO MATERIA MEDICA OF THE VEGETABLE AND ANIMAL KINGDOMS. BY JOHN M. MAISCH, PH.M., PH.D., Late Professor of Materia Medica and Botany in the Philadelphia College of Pharmacy. Revised by HENRY C. C. MAISCH, PH.G., PH.D. Sixth Edition, with two hundred and eighty-five illustrations. Pp. viii. 526. Philadelphia and New York: Lea Brothers & Co., 1895.

WE welcome this familiar book, solid both in contents and in mechanical execution, and once more read the authoritative descriptions and comments. Many books have appeared, which have been intended to fill either partially or completely the field occupied by this work, yet it is to Maisch that we turn as the court of last resort. This edition, revised by the son, presents but comparatively few changes, because of the accurate work and advanced scholarship of the lamented father; however, the last revision of the Pharmacopœia has necessitated the addition of some new matter, both in the text and as illustrations. The official drugs are distinguished, according to the preface, from the unofficial by the size of type, yet we find in large type, and, therefore, presumed to be official, *Asarum*, p. 137, *Thuja*, p. 288, and *Ignatia*, p. 361, which are unofficial.

We are not quite ready to believe that the chemistry of aconite is sufficiently exact to indorse the formulas as given on page 145. We note errors in orthography, p. 356, *jequiriti* for *jequirity*; p. 322, *limon* for *limonum*; p. 331, *Aleppy* for *Aleppo*; some variations in the same, as p. 214, *ursone*, p. 238, *urson*; p. 214, *hydrokinone*, p. 329, *hydroquinone*. The composition of *strophanthus*, p. 364; *cod liver oil*, p. 474, are hardly in accord with the latest investigations. On p. 93 it is stated that *pelosine* is identical with *beberine* and *buxine*; on p. 172 *bebirine* is identical with *buxine* and *pelosine*. In the first quotation *berberine* is undoubtedly intended, the alkaloid of *hydrastis* and *berberis*, in the second *beberine* is the corrected spelling which is not identical with *buxine* and *pelosine*. Of other errors we would note the unfortunate one of *Cassie* for *Cassia*, which is found in the preface. For the botanist and pharmacist the classified differential identification of cellular drugs is unexcelled, the arrangement of the matter is such that easy reference and accurate information are obtained. The illustrations, as a rule, illustrate and are inserted with good judgment. The syllabus of the official volatile oils is hardly so full of information as other portions of the work, and is almost the only section in which we have been disappointed in not finding the facts sought for. In the Table of Drugs Arranged According to Origin, we note the omission of some official representatives of animal origin, as *cod-liver oil*; but we commend the author for his table of drugs of vegetable origin, which gives in simple manner and compact form the family relationship of the source of the remedies of our daily practice. We congratulate the editor and publishers, that our old familiar friend has still further advanced in matter without increase of bulk, and that it will retain and quite likely increase the honor and popularity which have been secured by the previous editions.

R. W. W.



THE PRACTICE OF MASSAGE; ITS PHYSIOLOGICAL EFFECTS AND THERAPEUTIC USES. By A. SYMONS ECCLES, M.D. Aberd.; Member of the Royal College of Surgeons, England; Fellow of the Royal Medical and Chirurgical Society, and Medical Society, London; Member of the Neurological Society, London, etc. Pp. x. 377. London: Macmillan & Co., 1895.

OF books and papers on massage there had seemed to be a lessening. We might infer either that the profession is fully alive as to what could be gotten from its employment, or that interest in the subject had abated owing to unrealized expectations. We had inclined to the latter belief perhaps because massage was either a *dernier ressort* in the practice of the average physician, or that it was employed as a universal panacea. So when this book came to our table we determined to study it thoroughly, not so much because we expected to find new or startling truths, but because we were already acquainted with the writings of the author, a clinician of no mean ability. We hoped to be spared the recital of cases which would tax the credulity of the faith-curers and to meet with clinical reports such as our own Weir Mitchell might indorse; nor have we been disappointed. To be sure, some of the cases which are narrated are not in good taste, but for candor the book can be commended. It is something more than a treatise upon massage. Let him who doubts this carefully read Chapter V. on the Disorders of Digestion, and then note the care with which the cases were studied. We are quite surprised to find clarified neat's-foot oil (p. 208) recommended as a lubricant, for we had believed that if one were necessary vaseline would be preferable, and, further, that the best practice dispensed with one altogether. As matters which mar a book generally to be praised, we would cite the case found on p. 165, where it was claimed that all sorts of things were found in the motions, legs of "daddy-long-legs," bits of sewing-thread with knots upon the ends, and seeds, and, since seed-fruit had not been lately eaten, the suggestion that the bowel had proved more retentive than his memory. The originator of the raw beef and hot water treatment hardly deserves being designated as "Salusbury" (p. 109), although he might from this ingeniously weave a theory that his practices were conducive to health. We quite agree with the strictures of the author upon the method of Thure Brandt. This is a book upon massage by a well-informed clinician; it is definite, intentionally fair, recognizing its limitations, and a really valuable work for the physician. For all that it presents nothing really novel, its matter appeals to us as well worthy of our study.

R. W. W.

# PROGRESS OF MEDICAL SCIENCE.

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## THERAPEUTICS.

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UNDER THE CHARGE OF

REYNOLD W. WILCOX, M.D., LL.D.,

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SCHOOL AND HOSPITAL; VISITING PHYSICIAN TO ST. MARK'S HOSPITAL.

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### ANTITOXIN AND SPERMINE.

DR. G. E. KRIEGER writes of the relation of these drugs to natural chemism, and believes that the following conclusions are justifiable: 1. The reaction caused by pathogenic germs is a leucocytosis. 2. The effect of leucocytosis in a normally alkaline blood is the production of active principles from the cell-nuclein, the representation of which is spermine. 3. The effect of intra-organic oxidation is to cause an increase of vital resistance, or a certain degree of immunity. 4. It is possible to aid this physiological process of protecting the organism by the introduction of the serum of animals which have produced antitoxic elements, or directly by injections of spermine. The latter seems especially indicated in diseases in which the elimination of this physiological stimulant has been observed, and the employment of this remedy, which always causes increased cellular activity, is advised in every instance when an infection or even a depressed condition exists. The effect obtained in a number of diseases which, according to recent discoveries, seem, like the so-called infectious diseases, also to be based upon parasitic influence—as ascending spinal paralysis, poliomyelitis, tabes dorsalis, and sclerosis—certainly encourages further experiments.—*Notes on New Remedies*, 1895, No. 2, p. 17.

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### THE TREATMENT OF GOUT.

DR. KÖLISCH states that it is undeniable that a urate diathesis exists in the gouty condition, but the preceding morbid changes in the physiological disturbance appear to be due to the breaking up of nuclein ( $C_{29}H_{49}N_9P_3O_2$ ) and the formation of alloxurine bodies ( $C_4N_2H_2O_4$ ). The complex chemical change results in uric acid ( $C_3H_4N_4O_3$ ) and xanthine bases ( $C_5H_4N_4O_2$ ), which are comprehended under the term alloxurine bodies. Earlier investigation shows that a combination of diseases of the kidneys and uric acid

increases the elimination of these alloxurine bodies. In each one of the urate diatheses there is a greater amount of nuclein broken up or decomposed, which increases the fragmentary products or lower bodies of the series. We may therefore look upon nuclein and its decomposition as the chemical body which produces the characteristic symptoms in gout from a diseased kidney. According to this view, the alkalies are useful; an excess of albuminoid food must be guarded against, as this form of diet rapidly increases the leucocytosis in the alimentary canal, which finally augments the nuclein product. A moderate use of albumin is not contraindicated, yet tissues, rich in cellular matter, such as nuclein, should be avoided. Boiled meat may be allowed, since the kidneys eliminate the noxious extractive material, but the soup prepared from this meat should not be allowed. Carbohydrates are harmless, and fat may be used as a substitute for albumin. Everything in the vegetable kingdom may be allowed, excepting asparagus, which is absolutely forbidden. Alcohol should also be prohibited. Over-exertion in daily exercise should be carefully guarded against, because this greatly increases the splitting up of the nuclein.—*Medical Press and Circular*, 1895, No. 2954, p. 625.

DR. JACCOUD believes that in the treatment of non-articular gout an exclusively meat-diet will increase the uric acid and for that reason be hurtful. On the other hand, an exclusively vegetable diet will hasten arterio-sclerosis, the most formidable complication which can happen to the gouty, because this is the basis of the renal, cardiac, and cerebral lesions. The mixed diet should be prescribed, the most complete sobriety, and the most perfect regularity in the meals. Truffles, shell-fish, salt-water fishes, pork, and game are absolutely forbidden. Farinaceous food is not allowed if the patient tends to become obese. For liquids, water, white wine well diluted—for the French contain too much alcohol—and Moselle wines. Beers containing a low percentage of alcohol, French or that of Vienna, can be allowed. The strong beers—Munich, Nuremberg—are forbidden. Coffee and tea can be used in moderation. The only *régime* to be permitted is that under which the urine is abundant in quantity and of a specific gravity below the physiological normal. If at the end of a fortnight the patient does not improve, a partial milk-diet should be ordered, a quart of milk between meals, in two or three portions. If, in spite of this, sufficient improvement is not obtained, drugs must be employed. The preference is lithium benzoate, six to twelve grains in the day, generally as pills of one and one-half grains, taken at meals. After each pill a small quantity of an alkaline mineral water can be taken. This is continued for a fortnight; then it is omitted for at least a week. Piperazin and piperazidin are not more valuable than lithium. When the gouty are but slightly obese and suffer from the abdominal plethora of old writers—intestinal catarrh with constipation—in addition to the mixed diet and milk, it is necessary to administer Carlsbad salts alternately to lithium; the natural crystallized salt is preferable. The evening before, a hot solution can be made, which can be taken the following morning after taking care to agitate it once or twice. During eight days a teaspoonful in a half-glass of water should be taken. At the end of three or four days, rarely before, a laxative effect is obtained. The treatment can be omitted for five or six days, when ten days of treatment with lithium should follow; then after five



days the Carlsbad salts are repeated. The thermal springs are of the greatest importance for gouty patients who have not suffered from articular lesions. For those who have suffered, two months should elapse before they make use of them. Carlsbad is valuable from its temperature and large amount of sodium chloride and sulphate; Vichy, from its sodium bicarbonate. The indications are very different. With uricæmia, intestinal catarrh, flatulent dyspepsia, and tendency to obesity, Carlsbad is to be preferred; for lithiasis, Vichy. Both are contraindicated in even indications of cardiac conditions, and in interstitial nephritis. Other waters, less active and better borne, as Royat or Ems, should be chosen. If there are tophi, we should prefer those which contain more chlorine, of which Wiesbaden is the type, source Kochbrunnen, which can be used for drinking and bathing. For articular gout no water is preferable to it. If this is believed to be too strong, we can resort to the waters of Baden-Baden, which are very warm, or to those of Hamburg, less active because they are cold. The gouty, with a tendency to cachexia, should avoid these waters. Then we can resort to those which may be called waters of *lavage*, Martigny-les-Bains, Contréxeville, Vittel, Evian, cold alkaline waters to which it is necessary to add the lime-sulphur water of Capvern; all these are effective only when taken in large amount—eight to twelve glasses per diem. Since these are cold, they are difficult of digestion and not always well borne. Such also is Ragatz, which contains almost no mineral substance, and of which the dose is four glasses. The water as a beverage is the principal agent in treatment, but the baths are useful in chronic nervous and rheumatic affections.—*Bulletin Général de Thérapeutique*, 1895, 48e liv., p. 553.

#### THE ATROPINE-GROUP.

MR. GORDON SHARP notes that no group of bodies is more confusing to the student than the pupil-dilators, hyoscyamine, hyoscyne, daturine, duboisine, scopolamine, and atropine. Chemically hyoscyamine appears to be identical with atropine, and pharmacologically he does not know if we can distinguish between them. Duboisine was found to be (about 1878) an impure atropine. Daturine is believed to be identical with atropine by Schmidt and Ladenburg. Hyoscyne (Ladenburg's) in 1893 was believed to be identical with scopolamine by Schmidt and Hesse. Scopolamine, according to Hesse, is made up of two bases: one identical with hyoscyne and the other isomeric with it, which he proposes to name atrosyne. Other and conflicting views are summarized. As the results of his own observations he would say that daturine and duboisine may be called impure atropine. The varying effects obtained by different observers in the case of hyoscyne and scopolamine may be accounted for on the supposition that neither is a definite base. Hyoscyamine may be supposed to be identical with atropine. Atropine is the alkaloid of which one knows most, and it may be called the fundamental or representative base; our knowledge permits us to say, at least, that in hyoscyne and scopolamine we have a certain proportion of atropine along with a varying proportion of a conversion- or decomposition-product of atropine, and which we may call  $\alpha$ -tropeine. Instead, then, of multiplying names, we should call atropine what is usually atropine, and get

hyoscine and scopolamine free from any admixture, and have the resulting products by names corresponding to hematropine [?]. Personally, his experience has led him to think that hyoscine, scopolamine, daturine, and duboisine differ little from atropine, although other observers think differently.—*British Medical Journal*, 1895, No. 1825, p. 1547.

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#### THE EXTERNAL APPLICATION OF ANTIPYRETICS.

DR. H. GILLET sums up a consideration of this subject by stating that some physiologists still refuse to believe that the skin can absorb. Practically, applications of guaiacol may be useful in replacing the ingestion or subcutaneous injection of the drug or for completing its effect. Various authors insist upon the necessity of enveloping the surface of application with impermeable dressings to facilitate absorption. The action of the applications varies according to the mixtures employed. Ferrand has used equal parts of guaiacol and glycerin to relieve the intercostal neuralgia of the tuberculous; Championnière, the same for sciatica. This mixture does not irritate the skin; it even covers it with an impermeable coating and the pain disappears within a few hours, and, reappearing, is again relieved. But this mixture has no effect upon the temperature, because the guaiacol is not absorbed. In dose of twenty drops of the drug the temperature is reduced; this reduction persists three hours, it then re-ascends and may even go higher than at first. Further, all patients do not react to guaiacol, and there seems to be obtained a habituation to its use. The results which are reported certainly give good reason for the employment of this new method for reducing temperature.—*Journal des Praticiens*, 1895, 2e semestre, No. 26, p. 406.

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#### LORETIN.

DR. HERBERT SNOW has studied this organic iodine compound, of which the proper chemical title is meta-iodo-ortho-oxyquinoline-ana-sulphonic acid,  $C_9H_4IN.OH.SO_3H$ . It is a bright-yellow, odorless, crystalline powder, slightly soluble in water and alcohol. It is used as a dusting-powder, either alone or mixed with calcined magnesia, starch, or French chalk; as collodion (2 to 10 per cent.); in pencils of cocoa-butter (5 to 10 per cent.); in ointment (5 to 10 per cent.); with vaseline or lanolin; and as an impregnated gauze. If dusted on the skin or over a granulated wound, it does not give rise to the slightest irritation nor to any unpleasant sensation. It immediately destroys the bad odor of the most fetid cancerous sore, controlling this in a manner in which no other agent which has yet been tried will do. It has been employed in about sixty cases, mostly operations upon the breast and axilla, and has proved to be an ideal antiseptic and deodorant, with not a single drawback.—*British Medical Journal*, 1895, No. 1825, p. 1549.

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#### PREVENTIVE INOCULATION AGAINST CHOLERA IN INDIA.

DR. W. M. HAFKINE proposes the terms variolization (term employed as in smallpox) for the process of using a virus which is the infectious material taken from a patient affected with the disease, and vaccination for the em-

ployment of a vaccine which is a substance cultivated under conditions which will keep the microbe in a fixed state of virulence. The former is the method of Ferran; the latter is that of the author—the use of a modified virus. He gives two injections; the first is a mild form, and the second, after an interval of five days, is one whose virulence has been strengthened. The full effect of each is not attained until after five days have elapsed, so that the individual is not fully protected until ten days after the first inoculation. The microbe is cultivated under fixed and suitable conditions, and its virulence is known, so that it can be used with certainty and safety. One-twentieth of a culture-tube has been adopted as the standard dose. The amount of reaction is in direct proportion to the dose, and the amount of protection is in direct proportion to the intensity of the symptoms produced. A slight swelling and pain in the side are the usual local signs and there is a slight rise of temperature. He has made 70,000 injections upon 42,179 individuals without a single instance of mishap or accident. After giving statistics in detail, he concludes that in instances where cholera has made the largest number of victims, and when it has sufficiently spread so as to make it probable that the whole population were equally exposed, the result has been invariably favorable to inoculation. Applied during the existence of the epidemic, it tends to reduce the mortality even during the first ten days. The best method is probably to use doses of both vaccines, the second one being kept at the highest strength attainable. In support of his position, Koch is quoted as saying that the protective power of the method is established by the observations collected in India up to now, although further perfection and simplification may be possible. Treatment by antitoxin must be considered a decided success, but it cannot be used as a preventive treatment, as its effects on the system are very rapidly worn out. Neither the antidiphtheritic nor the anticholera serum lasts more than a few days. The treatment stands otherwise in regard to people already affected. His intention is to make use of antitoxic serum, and, in case it fails and there is danger of the patient succumbing before the antitoxin can take effect, its use can be combined with the transfusion of saline fluids. It is possible that the administration of antitoxic serum will mitigate the symptoms and diminish the active protection afforded by the vaccines.—*The Lancet*, 1895, No. 3773, p. 1555, and *British Medical Journal*, 1895, No. 1825, p. 1541.

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#### NEW METHODS IN TREATMENT OF MALARIAL FEVERS IN INFANCY.

DR. MONCORVO has used phenocoll hydrochloride in doses of from five to thirty grains each twenty-four hours, generally administered in solution, in fifty-five cases. It has been generally well tolerated and has rendered good service in several cases where it is difficult or impossible to administer quinine, but it cannot be said to possess any advantages over quinine in pernicious fevers. In mild cases it is useful and safe, even when the kidneys are somewhat diseased. Asaprol has been easy of administration on account of its solubility, its slightly bitter taste being concealed by an aromatic syrup, as that of peppermint, and it does not give rise to any untoward symptoms. It can be used in dose from five to forty-five grains *per diem*. Eighteen cases



are cited, and in but one case did it fail, and that was also tuberculous, and further complicated by severe broncho-pneumonia. In this case the fever resisted also antipyrin and quinine. In a child who suffered from malaria and chorea, both conditions were relieved by a daily dosage of seventy-five grains.—*Gazette hebdomadaire de Médecine et de Chirurgie*, 1895, No. 50, p. 590.

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#### ANTITOXIN.

DR. WILLIAM HALLOCK PARK considers the objections with reference to the treatment of diphtheria, comparing the mortality at the Willard Parker Hospital for the month of January. In 1894 it was 39.6 per cent. (no antitoxin); 1895, 29.4 per cent. (very weak antitoxin, temperature of wards 80° to 85° F.); 1896, 19.4 per cent. (very strong antitoxin, temperature of wards, four days excepted, 70° to 75° F.). There were large numbers of cases of laryngeal diphtheria admitted during 1895, which, after removal of the tube, appeared for a time to be doing well, but later developed a subacute broncho-pneumonia. A larger proportion of patients, however, finally got well than in the previous year, in spite of the complication. In searching for the causes of the increased frequency of these complications, it was found that with a lowered temperature of the ward and by diminishing the overcrowding, the result was obtained that no broncho-pneumonia developed in any patient which was not present on admission. The conclusions at which the writer arrives are: 1. That with serum, strong in antitoxin, and with increased experience, we may hope to save many lives by its early use. 2. That until we can entirely eliminate the use of horse-serum we will observe occasional disagreeable after-effects, but these will be rarely, if ever, of a dangerous nature.—*The Medical News*, 1896, No. 1206, p. 213.

M. MONOD reports that the mortality during the first six months of 1895 from diphtheria in 108 cities of France having a population of over 20,000 has remarkably diminished, the average of the corresponding period of the seven preceding years being taken as a standard (2626 to 904). This decrease is attributed to the increasing use of antidiphtheritic serum.—*La Médecine Moderne*, 1895, No. 101, p. 783.

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#### RHUS-POISONING.

MR. GEORGE M. BERINGER summarizes the various statements which have been made concerning this poison. It is pretty generally admitted that all parts of the plant are poisonous, and at all seasons of the year. The dust shaken from the roots can cause irritation whenever it comes in contact with the skin. As a preventive, washing the face and hands with a solution of hydrogen dioxide has given good results. Hot soda baths are efficacious in treatment, and locally the following lotion is preferred: Granular sodium sulphite, 1; glycerin, 4; camphor water to 32.—*American Journal of Pharmacy*, 1896, No. 1, p. 18.

[Pfaff has isolated the volatile substance known as toxicodendric acid, which has been held to be the active principle causing the eruption. He has found the real active principle to be a non-volatile, readily oxidizing oil which produces the characteristic effects of the poison.—R. W. W.]

## POISONED BY BISMUTH SUBNITRATE.

MR. GAUCHER reports four instances of poisoning after its use externally, one of these was fatal. An analysis showed that the drug was pure, so that the symptoms could not be attributed to lead. Three forms of poisoning are observed: 1. The benign form, in which the only symptom is a brownish-violet staining of the gums. 2. The more severe form, in which there is a more or less acute stomatitis, to which a chronic condition succeeds marked by gingival streaking and tattooing of the buccal mucous membrane. (3) The acute phenomena resist all treatment, the affected points ulcerate, and secondary infection follows, which gives rise to general symptoms, more or less severe, as fever, hiccough, vomiting, diarrhœa, albuminuria, to which the patient may sometimes succumb. Bismuth, when used externally, forms a soluble combination with the albuminoid substances which is readily absorbed. On the other hand, when taken by the mouth, the stomach-contents are too feebly acid for making a solution of the drug, and in the intestine the alkalinity makes absorption difficult, and this is increased by its being incorporated with the feces in which it is expelled. Mathieu reports an instance where five drachms of the drug were injected each day for eighty days without producing any symptoms beyond a slight stomatitis with pigmentation of the face recalling that of arsenic.—*Répertoire de Pharmacie*, 1896, No. 1, p. 32.

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## BISMUTH NAPHTHOLATE.

DR. EDMOND CHAUMIER regards beta-naphtol as the best of all intestinal antiseptics, although it has a disagreeable taste. It can be prescribed as a mixture with some bismuth salt or as a combination—beta-naphtol bismuth, which has no burning taste. The last in the alimentary canal decomposes, breaking up into naphtol and bismuth oxide. It is a gray powder, slightly aromatic, and contains 26.5 per cent. of beta-naphtol. In infantile diarrhœa the fetid stools lose their odor, the watery evacuations become thicker, and the green color disappears under the influence of this drug. It can be administered in 2 to 5 per cent. solution in quince-syrup, of which the dose is one teaspoonful. In diarrhœas of larger children and of adults the remedy acts quickly, and with a sufficient dose—75 to 150 grains in wafers—they disappear within one or two days. If the pain is severe, opium may be added. For both infants and adults it is well to continue the remedy for some time after the diarrhœa has stopped. The diarrhœa of the tuberculous is of great importance because it interferes with nutrition, emaciates the patients, causes them to lose strength, and prevents the administration of proper remedies. The remedy has been used as well in the temporary diarrhœa, which in a few days will undo the benefits of several months, and in the chronic form, which is almost continuous and constitutes the principal lesion. In the first case stop the creosote carbonate, the only active and safe drug against tuberculosis, and give naphtol bismuth, not only during the disease, but for several days after. In the chronic cases, when the diarrhœa has existed for several months or years, the abdomen is painful upon pressure and the appetite is very much diminished. After prolonged

use of the drug these symptoms disappear and the creosote can again be administered. In typhoid fever (two cases) the intestinal disinfection was perfect, the tongue was always clean and moist, and the convalescence was brief.—*Journal des Praticiens*, 1895, 2e semestre, No. 12, p. 184.

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#### ANTIPYRIN FOR CONJUNCTIVITIS.

DR. A. E. ANDERSON desires to call attention to the value of this drug as a remedy for conjunctivitis, acute, chronic, and granular. He uses a 10 per cent. solution, applying this to the tarsal conjunctiva with a pledget of cotton, taking special care to push the cotton well up into the retrotarsal fold. There follow a momentary sensation of pain and a gritty sensation, causing the patient to blink, which soon disappears. For use at home, thrice daily, a 4 per cent. solution may be ordered.—*Therapeutic Gazette*, 1895, No. 12, p. 863.

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#### ARECOLINE HYDROBROMATE.

M. MOUQUET, from the results obtained upon two horses, concludes that this drug acts as do eserine and pilocarpine combined, and, further, that its activity is greater than that of these drugs (arecoline produced a salivation at least equal to that of pilocarpine, the dose-proportion being 5 to 40). If its use should become common, it will be cheaper than the latter drug.

DR. G. BARDET calls attention to the fact that the drug above studied comes nearer to pelletierine than to eserine and pilocarpine; areca-nut has been successfully used as a tæniacide. It is proper, in view of its energetic action, to commence with small doses—one-thirty-second to one-sixteenth of a grain.—*Les Nouveaux Remèdes*, 1895, No. 22, p. 505.

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#### BORAX-INSUFFLATIONS IN INTESTINAL DISEASES.

DR. FERDINAND MERKEL reviews the literature of intestinal disturbances, especially flatulence, and cites the results obtained by Crämer in obstinate constipation by the use of boric acid. After other methods were found to be ineffective a powder-blower was employed. The nozzle of the instrument, well oiled, is introduced, with gentle rotation, into the rectum and the bulb is quickly and forcibly compressed. This ends the operation. For each insufflation 30 to 60 grains of borax are placed in the rectum. It is important that the calibre of the nozzle shall be at least 9 to 13 thirty-seconds of an inch in diameter and that the capacity of the bulb be sufficiently great to carry the above-mentioned amount into the rectum. The treatment should continue for four to six weeks, but marked improvement is found within the first week, sometimes even after the first insufflation. The effect of each application lasts from five minutes to three hours. In some cases there is no result, but generally within fifteen minutes there is an inclination toward a movement of the bowels. Usually there is a large amount of fecal matter expelled together with considerable odorless gas. The consistency of the stool is also diminished. Naturally, if intestinal atony is also present, other methods may be added—massage, electricity, high water or oil enemata—to secure a complete daily evacuation.—*Münchener medicinische Wochenschrift*, 1895, No. 52, S. 1209.



## SULPHONAL EXANTHEMATA.

DR. MAX WALTERS notes the previously reported cases, generally of erythema resembling scarlet fever, and reports two personal cases. He remarks that the eruption is mostly located in the follicles, and thence through confluence the efflorescence spreads, becoming large, reddened areas; in addition, vesicles are noted. On the whole, the resemblance is to scarlet fever, which rarely, also, shows vesicles.—*Therapeutische Monatshefte*, 1895, Heft 12, S. 656.

## THE PHARMACOLOGICAL ACTION OF PURGATIVES.

DR. WILLIAM MURRELL states that one thing is perfectly clear, and that is, that the majority of purgatives derived from the vegetable kingdom belong to the class of cutaneous irritants—*e. g.*, croton oil, gamboge, elaterium. This irritant effect leads, when the drug is taken internally, to increased peristaltic movement and to a rapid evacuation of the intestinal contents. The stimulation may be exerted on the mucous membrane itself or upon the motor ganglia which preside over the contractions of the intestines. Saline purgatives have an enormous advantage over purgatives of vegetable origin in not being irritant. It is probable that most of them act simply in virtue of their bitterness. The intensely bitter taste both of magnesium sulphate and of sodium sulphate is readily appreciated, even in very dilute solutions. Bitters excite the secretion both of the stomach and intestines. Gentian, quassia, calumba, and angustura administered immediately before meals improve the appetite and stimulate the powers of digestion. These drugs fail to act as purgatives because many of them contain astringent principles and they are commonly taken in small doses with sherry or gin, which by dilating the gastric bloodvessels facilitates absorption. The theory that the action of saline purgatives is solely to increase peristalsis is now abandoned. The natural purgative waters do not exert their characteristic action if the patient be confined to bed or less favorably placed for the passage of fluid into the intestines. In these cases the action of the aperient is materially assisted by massage of the abdomen, which facilitates the passage of the fluid through the pyloric orifice. The effect of bitter water upon the stomach is beneficial apart from the purgative action, and it is a common experience that patients whose breakfast ordinarily consists of a cup of tea and a piece of dry toast find that they can eat a good meal and digest it after a glass of Hunyadi Janos water sipped slowly while dressing. With regard to the purgative effect, the bitterness of the water is responsible for its excito-secretory action, whilst its low diffusibility impedes the reabsorption of the fluid. As a joint result of the stimulated secretion and diminished absorption there is a largely increased accumulation of fluid in the intestinal tract, which, partly from the effects of gravity and partly from a gentle stimulation of the peristaltic movement excited by distention, reaches the rectum and produces a copious and comfortable evacuation. Some saline purgatives affect the peristaltic movements so slightly that they are powerless to give the secreted fluid the necessary downward impetus, the result being that there is risk of re-absorption with attendant dangers of griping and discomfort. It is rarely

expedient to employ a single member of this group; much better results are obtained by judicious combinations which occur in the natural purgative waters. In the case of Hunyadi Janos water a half-tumblerful is diluted with an equal quantity of boiling water and sipped slowly whilst dressing in the morning, with the result of one copious and easy evacuation immediately after breakfast. The dose can be regulated to a nicety, and it can be taken month after month without the slightest risk of exciting a catarrhal condition of the intestines.—*Medical Press and Circular*, 1896, No. 2957, p. 25.

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#### GLYCERIN-SUPPOSITORIES.

MR. FRANK G. RYAN has studied the results of replacing the sodium stearate in these suppositories by agar-agar. If only 50 per cent. of glycerin was incorporated, the product was too elastic and lacked sufficient firmness to be introduced into the rectum. Those containing 75 per cent. could be used without much difficulty, but they did not possess the firmness of those made with sodium stearate. More than the latter named amount of glycerin could not be incorporated, as it tended to separate from the mass on cooling. The formula is: agar-agar, 1; water, 9; glycerin, 30. While these suppositories are not to the same extent affected by exposure, they cannot replace those made with sodium stearate on account of the smaller content of glycerin and their lack of firmness.—*Bulletin of Pharmacy*, 1896, No. 1, p. 15.

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#### GASTRO-INTESTINAL ANTISEPSIS.

M. FERRAND administers these drugs in divided doses in order to avoid the formation of masses and consequent toxic symptoms, and to permit of decomposition. Further, the methods which are successfully employed by surgeons should not be lost sight of—the freeing the intestinal canal from fermentable material. Attention should also be called to the value of the variations of urinary toxicity as indicating the success with which the remedies are applied.—*Bulletin Général de Thérapeutique*, 1896, 1re liv., p. 3.

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#### OREXIN.

DR. HOLM remarks that the unpleasant symptom produced by the drug is the painful burning sensation in the buccal and œsophageal mucous membrane, which is obviated by its administration in wafers. This applies only to the hydrochloride; the basic orexin can be given in powder. The dose of four grains must not be exceeded and not more than eight grains be administered in one day. Generally one dose is given thirty minutes before the mid-day and the evening meal; for *hyperemesis gravidarum* one powder only before supper. Ten cases are briefly reported, to which twenty-three other cases of inappetence from various causes are added. Of these patients, five abandoned the treatment; in nine the result was good; in twelve an increase of appetite was shown; four gave a doubtful result; in two failure was observed. One of these suffered from tuberculosis and the other from hysteria. In general the statements of Penzoldt as to its power of increasing the appetite seem to be verified.—*Therapeutische Monatshefte*, 1896, Heft 1, S. 11.

MEDICINE.

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UNDER THE CHARGE OF

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AND

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A CASE OF ACROMEGALY.

MENDEL has reported (*Berliner klin. Wochenschrift*, 1895, No. 52) an interesting case of acromegaly. The patient was an unmarried woman, twenty-five years of age. At fifteen she developed a goitre, the growth of which was checked by the local use of iodine. At twenty-three menstruation, which had always been regular, ceased, and did not appear again. About that time left-sided hemicrania and temporal heteronymous hemianopsia appeared. The knee-jerk was absent. There were no signs of acromegaly. The conditions mentioned continued unchanged for a year and a half, after which characteristic signs of acromegaly appeared in the soft parts and skeleton. The neck measured 36 cm., the thyroid being enlarged, though the thymus was not. The hemianopsia was unusually striking. From the symptoms present it could hardly be doubted there was a tumor or hypertrophy of the hypophysis. The absence of the knee-jerk is of interest, because it has been only rarely observed in this disease. As there were no other symptoms of disease of the posterior columns, Mendel attributed the absence of the reflex to basal disease of the brain.

The patient had been treated for several months with thyroid tablets without any benefit. For two weeks before the report was made she was given beef-hypophysis to the amount of about two grammes daily. This caused no unpleasant symptoms. The patient could bring her teeth together better than before, and during the last four days of the treatment the knee-jerk had returned on the left side. The further history of the case will be looked for with interest.

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THE DIAGNOSTIC IMPORTANCE OF THE EXAMINATION OF THE  
FASTING STOMACH.

SCHÜLE (*Berliner klin. Wochenschrift*, 1895, No. 52) has made some investigations in this subject, concerning which previous researches have been very contradictory. As the term "fasting stomach" cannot be applied to the organ after it has been receiving saliva and pharyngeal secretions, the observations were made on persons at once on waking in the morning. Nine subjects were used, six of whom were trained by previous experiments in the swallowing of the stomach-tube. The result of the experiments was that in thirty-one out of thirty-four trials the stomach contained from 2 to 23 c.cm.



of fluid. This was always acid in reaction, and accordingly contained gastric juice. Free hydrochloric acid was present only seven times. Mucus, bile, peptones, and pepsin were also occasionally present. The cause of the presence of the gastric juice must be sought in the saliva or secretions from the pharynx, which even in the small quantities that are swallowed while sleeping excite secretion.

As to the possibility of a continued hypersecretion the author has no personal experience, but gives the following statements bearing on the question :

If there is a hyperacid secretion in the fasting stomach, even in small quantities, it must be looked on as pathological.

If the fasting stomach contains a larger quantity, *i. e.*, 50 to 100 c.cm., this may be due to a pathological process, but is not necessarily so. Alkaline contents indicate a disturbance of the gastric chemistry.

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#### PERISPLENIC BLOOD-CYST.

VON SUBBOTIN (*Wien. med. Presse*, 1894, No. 36) calls attention to a rare disease of the spleen, two cases of which have come under his observation. In one case the patient was a farmer, thirty years old, who for sixteen years had repeated attacks of severe malarial fever, with enlargement of the spleen. Laparotomy was performed, the tumor found adherent to the peritoneum. The tumor was incised, and 1500 c.cm. of dark bloody fluid removed. Microscopically, the fluid showed nothing characteristic except altered blood-corpuscles. The interior of the cyst was smooth and hard. It covered all the outer and part of the inner surface of the spleen. Subbotin thinks the cysts develop from the capsule and not from the parenchyma of the spleen.

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#### THE PROGNOSIS IN GRAVES'S DISEASE.

PRIBRAM (*Wiener klin. Rundschau*, 1895, No. 44) has noticed a gradual subsidence of the cardinal symptoms in a large proportion of cases of Graves's disease observed during a long time. In some cases exophthalmus, struma, tachycardia, tremor, and psychic alterations have disappeared, and notwithstanding severe physical and mental exertion have not returned within from ten to twenty years. In such cases complete recovery may be claimed. In one case recovery occurred even after marked dropsy had appeared, and in another after dropsy, erysipelas, pneumonia, albuminuria, and emaciation. Hospital treatment, with rest and care, was often followed by improvement, sometimes by recovery. These facts should be remembered when the operative (or medicinal) treatment of Graves's disease is under consideration.

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#### CHANGES IN THE BRAIN IN CHOLERA.

TSCHISTOWITSCH (*St. Petersburger med. Wochenschrift*, 1895, No. 31) makes a preliminary communication on the condition of the brain in Asiatic cholera, based on examinations in cases dying with cerebral symptoms. The observations show that alterations in the brain can be demonstrated in cases dying in the algid stage within twenty-four to thirty-six hours after the onset. The changes are more marked in cases dying in the stage of reaction, or in

patients who have gone into the typhoid condition. The nerve-cells and the bloodvessels are chiefly affected, the neuroglia and nerve-fibres being intact. In the early stages cellular œdema and vacuolization are common. Disappearance of the chromatin, swelling of the protoplasm, or granular degeneration also occurs. The smaller bloodvessels are distended; the perivascular spaces often filled with blood and pigment. Hemorrhages into the brain-substance were not observed, nor was there emigration of leucocytes. There is sometimes granular degeneration of the protoplasm of the neuroglia-cells, though their nuclei are not affected. The changes affect especially the frontal and paracentral convolutions; least of all the occipital convolutions and the cerebellum. The changes, in short, are degenerative and necrotic, rather than inflammatory.

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MALIGNANT ENDOCARDITIS FOLLOWING GONORRHOEA.

DAUBER and BORST (*Deutsches Archiv für klin. Med.*, Bd. 56, p. 257) make an interesting addition to our knowledge of malignant endocarditis following gonorrhœa by the report of a case observed by themselves, and a brief critical reference to the literature of the subject. In their own case, a man of twenty years had acute gonorrhœa, inflammation of the right spermatic cord, para-urethral abscess, bubo, tendo-vaginitis in the hand, and myositis. The heart on admission showed no lesions, but gradually symptoms developed pointing to aortic insufficiency. Septic nephritis and hypostatic pneumonia closed the scene. In the beginning the urethral pus contained gonococci in pure culture (as shown by staining).

Later, these became less numerous and finally disappeared, while other bacteria of various kinds became numerous. It is important to note that symptoms of endocarditis began on the eighteenth day after the appearance of the urethral discharge, at a time when the gonococci were still present. Examination of the blood at various times showed no micro-organisms, except once, no doubt as the result of contamination. The autopsy, made with the necessary precautions, revealed extensive ulceration and vegetations on the aortic valves, with various changes in the heart and other organs not necessary to mention. In the vegetations were diplococci, some of which had the typical form of gonococci and were within the cells. They decolorized after Gram's method, were sensitive to the action of alcohol, and had, in short, all the morphological and tinctorial peculiarities of gonococci. They differed, however, from the latter in the appearance of cultures on human blood-serum. Unfortunately the urethral diplococci were not cultivated. The authors deny that the gonococci caused the endocarditis in this particular case, though they admit the possibility of a gonococcal endocarditis. In all cases cultures are necessary in order to identify the species.

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BLACKWATER FEVER.

PLEHN (*Berliner klin. Wochenschrift*, 1895, Nos. 25, 26, 27) gives an elaborate report on the so-called "blackwater fever" of the west coast of Africa, the "fièvre bilieuse hématurique," or, in general terms, pernicious fever of that country. This appears to be spreading in the Cameroons, though varying in severity in different seasons. It caused twenty-six per cent. of all

deaths among white settlers since 1890, and made up about one-eleventh of all cases of fever in the district. Negroes are less susceptible than the whites, though not immune; Chinese seem especially predisposed. Individual disposition varies. One attack increases the tendency to future ones. Exciting causes, such as emotional disturbances, care, and anxiety, may often be observed, some interesting examples being cited. The period of incubation is difficult to determine, as the attack usually comes on as a recidive of milder malarial disease. Prodromal symptoms, such as depression, loss of appetite, pain in the back and limbs, may occur and last for several hours to several days. At such times a slight rise of temperature may be demonstrated. In some cases the hemoglobinuric attack comes on in an intermittent or remittent fever of simple type. In contrast to the uncomplicated malarial fevers of the Cameroons, in which an initial chill is usually absent, the blackwater fever is usually ushered in by a severe and protracted rigor. This can occur before or during the rise of temperature or at its acme, and is likely to recur at irregular periods, like the chill of septic fever. The patient is usually restless, anxious, and alarmed, the intellect often slightly clouded. There is rarely stupor in the beginning. The most painful symptoms are nausea and intractable vomiting, with a feeling of oppression in the chest and severe dyspnoea. Often there is formication or numbness of the fingers and toes. In the beginning, or soon after, icterus appears and rapidly increases in intensity. In only one out of thirty-nine cases was hemorrhage recognized during life. The temperature-curve resembles that of sepsis. In severe cases the temperature may be at  $104^{\circ}$  for many hours, then falling rapidly. Continued fever is rare in whites, but is observed in the complicating pneumonia common among negroes affected with the disease. Temperatures above  $106^{\circ}$  are rare. Hemoglobinuria sometimes occurs with mild elevations of the temperature. The pulse is frequent (120-140), hard and full; later small, quick, and intermittent. Physical examination reveals a mild bronchitis in some cases; the heart-sounds are often impure. The abdomen is sensitive; the spleen is slightly enlarged in about half the cases. The blood-corpuscles and hemoglobin vary much, the proportions being obscured often by concentration of the blood. Large numbers of macrocytes are found, and microcytes and poikilocytes occur. The urine soon becomes dark red or even black, with a greenish tint. The foam is yellow, the specific gravity high (1030-1032), or in mild cases normal, the reaction acid unless irritation of the bladder causes slight alkalinity. The quantity of urine is diminished, sometimes there is almost complete suppression. There is often irritation of the bladder and urethra. The urine throws down a copious sediment, containing mucus, bladder and kidney epithelium, hyaline and epithelial casts, debris, and granular pigment-masses. Bile coloring-matter and acids cannot be found; albumin is present in large amounts, up to one per cent. The precipitated albumin is colored by hemoglobin, but no blood-corpuscles are found. In other words, there is a "nephritis due to the pathological secretions," and the further course of the disease is much affected by this complication. In mild cases the evidences of nephritis disappear suddenly, in more severe cases the course is protracted and the dangers are the same as those of nephritis from other causes. In a certain proportion of cases death is due to heart-failure, with thrombi; in others to anuria. In some cases



there are mild icterus and albuminuria, though hemoglobin cannot be recognized in the urine. In some cases there is paroxysmal hemoglobinuria. In the blood small unpigmented parasites are found. They are difficult to see, show distinct but rather slow motion and growth. They are stained best in fresh preparations. Gradually an oval body develops, reaching a size equal to one-fourth the diameter of a red blood-corpuscle. This afterward breaks up into five or six small oval bodies, staining best at one pole. These produce a "rosette" body or soon become free and rapidly move away in the blood. Crescents are found, but not constantly. They resemble those found in other localities morphologically, but differ from them in the peculiarity of taking the eosin-stain. Pigment is rarely found free, more frequently within the leucocytes, never in the red corpuscles. Whether the differences in the characteristics of the parasites as compared with those of other places are due to the peculiarities of the soil or indicate a new species, whether related to or distinct from similar forms found in Italy and Java, the author does not undertake to say. The parasite is distinguished clinically by its resistance to quinine, and on account of this and the irritating effects of the drug on the kidneys Plehn gave up the use of quinine in the treatment of his cases. At the same time the tendency to spontaneous recovery in blackwater fever is marked. Chloral and morphine, with sinapisms to the epigastrium, oxygen-inhalations for the dyspnoea, and ether-injections for collapse are the remedies relied on. The nephritis and its results are treated in the usual way. After the disappearance of the acute symptoms quinine is given in gramme doses to prevent recidives. [It is to be regretted that the author has not told more about the parasites. From his description the resemblance to the "unpigmented parasite" described by Marchiafava and Celli is almost complete. The results of post-mortem examinations, and the condition of the parasites in the internal organisms, should have been mentioned, especially so since the author says the parasites form no pigment, but dissolve the hemoglobin, and yet describes the occurrence of pigment in the leucocytes and in the liver and spleen. That the organisms are more resistant to quinine than the larger forms makes the resemblance to those first described in Italy greater, but we do not learn from this paper that Plehn used quinine in an efficient manner, so that his statement as to its inefficiency carries little weight. Regarding the pathology of blackwater fever, the author speaks of it often as a hematuria, but expressly says in other places that it is a hemoglobinuria, and that red corpuscles are never found in the urine; yet it must be a remarkable nephritis in which there is albumin in the urine to the amount of one per cent. with epithelial casts, but no blood-corpuscles. Can it be that the urine was not examined fresh? No doubt the study of pathology on the West Coast is difficult, and the author deserves great credit for the observations here reported. The field is a rich one and competent investigators are greatly needed.]

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#### PHYSIOLOGICAL FUNCTION IN METASTATIC CANCER OF THE THYROID.

VON EISELSBERG (*Archiv für klin. Chirurgie*, 1894, Bd. 48) reports the case of a woman, of thirty-eight years, who developed symptoms of cachexia thyreopriva after the removal of an adenoma of the thyroid. These symp-

toms improved, however, coincidently with the development of a tumor in the sternum, which at first grew slowly, later more rapidly, but especially so during the menstrual periods. After the removal of this tumor typical attacks of tetany appeared. These in turn became rarer and the woman passed into a condition of chronic cachexia thyreopriva. A tumor appeared later on the scapula, but was not removed. The tumor of the sternum proved to be a cylinder-cell carcinoma, some of the tubules of which contained small drops of colloid. From the course of events von Eiselsberg concludes that the tumor of the sternum carried on the functions of the thyroid vicariously—a unique example of a new growth, especially a malignant one, carrying on a physiological function. (The idea that the tumor was an accessory thyroid is rejected.)

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#### GASTRIC CRISES IN DIABETES MELLITUS.

GRUBE (*Münchener med. Wochenschrift*, 1895, No. 7) gives the name of gastric crises to the attacks which occur not infrequently in diabetics, coming on suddenly with vomiting, colicky pains, dry and coated tongue, cramp in the legs, and slight fever. Diarrhœa sometimes occurs. The attacks last from several hours to several days. Grube thinks the attacks represent a form of diabetic intoxication in which the vagi are irritated by toxins circulating in the blood. They sometimes appear early in the course of diabetes. Under proper treatment recovery is the rule. The most important thing is to cause copious stools by means of enemata. Hot applications to the abdomen are also useful. The vomitus consists generally of the undigested meal previously taken, and contains free hydrochloric acid. As a prophylactic measure the author recommends the avoidance of strict meat-diet. Grube has used with advantage an extract of beef-pancreas in digestive disturbances of diabetics. (The preparation has no effect on the excretion of sugar.)

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#### TUBERCULOUS ULCER OF THE MOUTH.

WALTER (*Therap. Monatshefte*, February, 1895) reports the following interesting case: A patient with tuberculosis of the lungs and larynx noticed the escape of liquid food through the nose. There was also pain in the left side of the mouth. Examination showed a large ulcer of the alveolar process on the left side, between the first bicuspid and the last molar tooth. There was a large cavity extending into the antrum of Highmore. The edges of the ulcer showed miliary tubercles. The tubercular ulcer arose apparently after extraction of the teeth, the tubercular sputum of the patient being pressed against the raw surfaces in the act of expectoration. Though rare, the possibilities should be borne in mind in the extraction of teeth in tubercular patients.

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#### THE LEUCOCYTES IN TUBERCULOSIS.

STEIN and ERBMANN (*Deutsches Archiv für klin. Med.*, Bd. 56, p. 323) contribute a timely article on this subject. They have avoided the more serious causes of error in previous work in the same line by using a larger number of cases—sixty in all, by making very numerous blood-counts, and

by counting more leucocytes than is usually done. In many cases the clinical diagnosis was confirmed by post-mortem examination. In counting the white corpuscles a modification of the method of Thoma was used, in which, instead of counting the corpuscles in the squares of the blood-counter, all those in a number of fields were counted, after estimating the contents of the space covered by the field. For many interesting details the original should be consulted; the following conclusions give the most important results: In beginning phthisis the number of leucocytes is normal. In advanced cases, but where cavity-formation has not taken place, the number is also normal. After attacks of hæmoptysis there is usually moderate leucocytosis, which disappears after the cessation of the hemorrhage. In advanced tuberculosis with chronic infiltration, but where destruction of tissue is slight or has not yet begun, the leucocytes may be normal. Increase of leucocytes is encountered in cases with cavity-formation; in cases with chronic suppuration as the result of carious processes; in final exudative processes; and in cases with hyperplasia of lymph-glands. As regards cavity-formation the following statements are important: If leucocytosis occurs in a tuberculous case in which there is no chronic suppuration and no exudation, ulcerative change, *i. e.*, cavity-formation, may be diagnosed. If in a case with normal leucocytes for a long time an increase takes place, excavation may be concluded. As long as the leucocytes are not increased the existence of a cavity, at least one of considerable size, may be excluded. The cause of the leucocytosis is not the tuberculous poison itself, but a secondary infection, a septic process, which may be the result of various bacteria.

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#### TABES DORSALIS AND SYPHILIS.

STORBECK (*Zeitschrift für klin. Med.*, Bd. 29, p. 141) has analyzed the histories of 108 cases of tabes in the hospital and private practice of Professor Leyden. Of these, 22 were syphilitic; 23 had doubtful histories; and in 63 syphilis could be excluded. Supposing that half of the doubtful cases were really syphilitic, the result would be 30.6 per cent., which Storbeck thinks is not higher than might be expected from the frequency of syphilis, so that the relation of the two diseases does not seem to him established. The value of the article is increased by the fact that it contains abstracts of the clinical histories of the 108 cases, and also a table showing the percentage of syphilitic cases in tabes according to forty-eight authors, from the 97 per cent. of Déjérine to the zero of Mayer.

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#### PROTOZOA (TRICHOMONAS) IN SPUTUM.

SCHMIDT reports three cases from the medical clinic in Bonn in which flagellate protozoa were found in the sputum.

The first case was one of aspiration-pneumonia, following cancer of the larynx. There was slight dilatation of the bronchi. The second case was one of chronic pneumonia and pleurisy and probable dilatation of bronchi, subsequent to the aspiration of a splinter of bone. The third case was one of bronchiectasis of long standing.

In all the cases the protozoa were found only in the "Dittrich's plugs,"



in variable numbers. The average size was that of a pus-corpuscle. The form was usually oval or long and irregular. The protoplasm was granular, whether from ingested bacteria the author could not be certain. A nucleus could rarely be seen except in dead specimens. At one end were from one to four flagella in lively motion, and extending back from these, about half the length of the body, an undulating membrane. At the opposite end of the body was a pointed tail, which sometimes served as an organ of support. Schmidt also noticed amœboid motion and the formation of pseudo-spods, which appeared at various parts of the body. The name *trichomonas pulmonalis* is suggested, though the author admits the species may be the same as that found in the vagina. Staining was not successful, nor could the parasites be cultivated. The organisms disappeared in the second case as the condition improved. Schmidt looks on the parasites as non-pathogenic.—*Münchener med. Wochenschrift*, 1895, No. 51.

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#### THE RELATION BETWEEN THE ACIDITY OF THE GASTRIC JUICE AND THE ACIDITY OF THE URINE.

MATHIEU and TREHEUX, after reviewing the work of others on this subject, give the following conclusions as the result of their own observations:

1. There is a relation between the acidity of the gastric juice and the acidity of the urine.

2. The more acid is produced in the stomach, either from normal secretion or food-fermentation, but especially from the fermentation of milk, the more the excretion of acid by the urine, during digestion, is increased.

3. Under normal conditions the acidity of the urine diminishes considerably during the three to five hours following digestion, and later increases again. This diminution in acidity may be preceded by a passing increase during the first hour of digestion, as if a certain amount of acid was immediately passed on with the ingested fluids and rapidly excreted.

4. As a rule, there is an almost absolute parallelism between the curves which represent the relative acidity (acidity per 1000) and the absolute quantity of acid excreted. This parallelism is wanting when a certain degree of polyuria exists after a meal; the curve of the relative acidity is then elevated, whilst that of the absolute acidity is depressed.

5. When a notable quantity of acid secretion is removed from the stomach, either by vomiting or lavage, this removal is followed by a notable diminution in the acidity of the urine. The urine may become alkaline under these conditions.

6. The average quantity of acid eliminated hourly by the urine is higher in those with increased acidity of the stomach-juice than in those with diminished acidity.

7. The ingestion of milk notably increases the quantity of acid excreted by the urine; this is due, without doubt, to the fact that milk rapidly gives rise in the stomach to the formation of a notable quantity of lactic acid, and that this acid is rapidly carried to the kidneys on account of the increased diuresis.

8. It is not yet possible to trace the curves of urinary acidity during digestion in such a manner as to be able to diagnose the chemical variety

of dyspepsia present. It seems very probable that such curves cannot be traced.

9. It is necessary to exclude milk from test-meals given prior to the study of these curves. The test-meals must be identical in all cases.

10. The cases studied must be submitted to a constant *régime* during a sufficiently long time, as we have seen beer consumed the day previous sensibly elevate the proportion of acid found.—*Archives Générales de Médecine*, November, 1895.

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## SURGERY.

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UNDER THE CHARGE OF

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ASSISTED BY

|                                                                                                                                              |     |                                                                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------|
| <p>ALFRED C. WOOD, M.D.,<br/>INSTRUCTOR IN CLINICAL SURGERY, UNIVERSITY<br/>OF PENNSYLVANIA; ASSISTANT SURGEON,<br/>UNIVERSITY HOSPITAL.</p> | AND | <p>C. L. LEONARD, M.D.,<br/>ASSISTANT INSTRUCTOR IN CLINICAL SUR-<br/>GERY IN THE UNIVERSITY OF<br/>PENNSYLVANIA.</p> |
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### SOME INTERESTING STATISTICS ON THE RADICAL CURE OF HERNIA.

In the *Revue Médicale de la Suisse Romande*, STENSSON and ERDMANN report one death in 106 operations for the radical cure of hernia. The death occurred on the tenth day. The autopsy showed acute enteritis and nephritis.

Macewen, in 98 operations, reported one death, which was due to scarlatina.

Bassini had one death after 250 operations. The fatal result was due to pneumonia which supervened after the wound was entirely healed.

Kocher (second report) records 119 operations with one death, which was caused by pulmonary embolism on the fifteenth day. Lucas Championnière reports 266 operations with two deaths—one from internal strangulation, the other from pulmonary congestion.

Kocher (third report) relates the cases of 192 patients on whom were done 220 operations without a death.

As to the recurrences, Lucas Championnière has had 17 recurrences after 275 operations, but only 141 of the patients had been seen more than two months after the operation.

Kocher reports 15 recurrences after 220 operations, 174 of the patients having been seen some considerable time after operation.

Bassini has had 7 recurrences out of 149 patients seen six months after operation.

Macewen knows of but one recurrence after 98 operations.

The danger of the operation is from infection and intestinal and pulmonary complications. The principal cause of recurrence seems to be that tendency to abnormal laxity of tissue that was the original etiological factor.

Where recurrences happen the whole benefit of the operation is not lost.

The recurrent hernia comes down slowly, is small and reducible, can be easily retained by a bandage, and usually causes no pain.

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#### THE EFFECT OF RESECTION OF THE VASA DEFERENTIA ON THE PROSTATE.

GUYON, at the Ninth French Surgical Congress (reported in *La Médecine Moderne*, October 23, 1895), announced his experimental and clinical observations as to the influence of section of the vasa deferentia on the prostate.

In dogs, he says, after careful experiments, the effect of bilateral section of the deferentia on the prostate cannot be compared with that produced by double castration. Section of the vasa deferentia produces some effect that may in time equal that of castration, but the difference after three months between the prostate affected by the two operations is very striking.

In three cases of urinary retention from prostatic hypertrophy the section of the deferentia seemed to bring relief, but the diminution in the size of the prostate was scarcely noticeable.

He admits that careful catheterization or a *sonde à demeure* may sometimes ameliorate the condition of patients suffering from prostatism quite as much as did these operations, and confesses that at most it is not a radical cure, but a palliative operation.

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#### VARICOCELE AND ITS TREATMENT.

DARDIGNAC, in *Revue de Chirurgie*, September, 1895, reports eighteen cases of resection of the scrotum for painful varicoceles. When the varicocele was double or very large, badly stretching the scrotal tissues, the resection was bilateral. In three of the cases consequent hæmatoma required the cutting of stitches to relieve tension, but these were the only untoward events in the series. Most of the cases were done three to five years ago, and though the patients have since been actively employed, some of them not wearing a suspensory, there has been no recurrence, and the patients express themselves as perfectly satisfied with their condition.

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#### MAMMARY TUBERCULOSIS.

GAUDIER and PERAIRE, in *Revue de Chirurgie* for September, 1895, add the report of three new cases of mammary tuberculosis to the thirty-nine that have so far been reported in medical literature. All three were only finally diagnosticated by the presence of the tubercle-bacillus. In one of the cases a pleurisy, in the other an old coxalgia, would have aroused suspicion as to the etiology of the breast-tumor, but otherwise there were no clinical manifestations to differentiate it from malignant disease. Usually tuberculosis of the mamma runs a slower and more insidious course than any of the forms of cancer, but in one of these cases its rapid development caused suspicion of a fulminant malignant neoplasm.

Age seems to have very little influence. One of the patients was twenty years, one twenty-six years, and the third forty-two years.

In none of the cases was there any history that would point to any etiological influence of the puerperium, of lactation, or of trauma in the production of the condition.



RAPID AND EASY METHOD OF TRANSPLANTING THE URETERS INTO THE  
INTESTINE WITHOUT SUTURE BY MEANS OF A SPECIAL ANASTOMOSIS-  
BUTTON.

DR. ACHILLE BOARI describes his button and the technique for its use in *Il Policlinico*, October, 1895. Up to this time the objection to the implantation of the ureter in the intestine has been the fear of ascending infection of the kidneys by intestinal micro-organisms. Giordano and Vignoni have each succeeded in keeping dogs alive for some months after transplantation of the ureters to the rectum, and Chaput has transplanted the ureter in the human female to the descending colon with perfect success and no serious after-complications. The patient is in good health—three years after operation. Chaput says “the passage of the urine into the intestine causes no inconvenience, does not disturb digestion, or irritate the mucous membrane. It only provokes rather frequent stools, but not oftener than the normal urinations. It is not necessarily followed by either hydronephrosis or pyelonephritis from ascending infection, as my observations show.” Two additional successful cases after the use of the button are reported by its inventor, in which the button came away on the eighth and twelfth days respectively. In neither has there been any signs of uræmia since the operation.

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INTRACTABLE VOMITING CURED BY PYLOROPLASTY.

PROF. AGOSTINO PACI, in *Il Policlinico*, October, 1895, reports a case of vomiting, which was slowly but surely threatening the life of the patient from inanition. After every other means had been tried in vain, an operation on the pylorus was suggested as a last resort. The condition found was stenosis of the pylorus, with extensive adhesions to surrounding structures, caused by an old perforating ulcer. The pylorus was incised and the longitudinal incision made transverse by stitching, thus securing tissue for the re-establishment of the lumen of the pyloric orifice.

The post-operative course of the patient was uneventful. No liquid or food of any kind was allowed for four days, then nutritive enemata were given. On the fifth day some broth was given. On the seventh day an egg was allowed. The patient has not suffered since from any of the former obstructive symptoms.

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DISAPPEARANCE OF DYSURIA IN CASES OF ENLARGED PROSTATE AFTER  
CASTRATION.

ALBARRAN (*Le Mercredi Médicale*, November 6, 1895) suggested before the Ninth French Surgical Congress, October 21st, that the immediate alleviation of the urinary symptoms after castration and the notable decrease in the size of the prostate that can be demonstrated within a few hours after the operation may be due to the depletory effect of the operation on the abnormal congestion of the gland that exists in hypertrophy.

The benefit is rendered permanent by a true atrophy of the prostate that takes place later. The extent of alleviation depends upon the capability of the bladder-walls to regain their normal contractility. Where this has been organically impaired through the long continuance of the pathological pro-

cess some of the symptoms of dysuria will remain. M. Legueu, in the discussion, reported two cases of castration for prostatism, one without any relief, and without decrease in size of the prostate: the other followed by absolute disappearance of all urinary symptoms.

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#### SUTURE OF ACCIDENTAL OR OPERATION WOUNDS OF LARGE VENOUS TRUNKS.

M. RICARD reported (*La Presse Médicale*, November 6, 1895) before the Ninth French Surgical Congress two cases in which by suture of large venous trunks he had succeeded in preserving the continuity of the vessels.

In the first case, the brachio-cephalic, he employed the Lembert suture and supported the vein by suturing tissues carefully above it.

In the second he sewed up an incision in a dilatation of the femoral, with four stitches, "just as if it had been an ordinary wound," and then stitched the skin above it.

The union in both cases was perfect. There was neither hemorrhage nor consequent disturbance of the circulation, so that the lumen of the vessel seems to have been left free.

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#### EIGHTY CASES OF LITHOTRITY.

ALBARRAN, of Paris, announces in *Le Mercredi Médicale*, November 6, 1895, the statistics of eighty lithotritry-cases in his personal experience. There was but one death, though in more than two-thirds of the cases the bladders were infected and in some there was pyelonephritis.

There were 46 phosphatic calculi, 29 uric acid, 4 urophosphatic, and 1 oxalic.

Of the patients, 20 were over seventy years and 7 were over seventy-eight years. The oldest was eighty-four years, and was operated on successfully without an anæsthetic, because of aortic valvular disease.

Five of the patients were females—one a girl of ten years. The only death in the series was due to anæmia, in a man of sixty-one years, on whom the operation was done without incident and occupied but twenty minutes, the calculus being of uric acid of but medium size.

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#### SURGERY OF THE LUNG.

PAUL RECLUS, at the Ninth French Surgical Congress (*La Médecine Moderne*, October 23, 1895), reviews this subject and concludes:

1. That surgical interference in tubercular cases must be proscribed.
2. In primary cancer no conditions can occur in which pneumonectomy would be feasible.
3. As regards cavities, incision is sometimes a justifiable palliative measure.
4. Resection of a portion of the lung for hemorrhage is a last resource; that its success in three reported cases requires the surgeon to bear the procedure in mind.
5. Hydatid cysts, gangrene, and abscess are all benefited by incision. The intervention in these cases is radical and often saves the life of the patient.

CIRCUMSTANCES UNDER WHICH CHLOROFORM IS PREFERABLE TO ETHER  
AS AN ANÆSTHETIC.

GAY, in commenting on anæsthetics (*Boston Medical and Surgical Journal*, 1895, No. 18), says: "Sulphuric ether, under ordinary conditions, is as safe as can reasonably be expected of any agent which produces such beneficent results; that chloroform is safe in a vast majority of instances, but that fatal accidents do occasionally occur under circumstances in which they were not anticipated, and that these accidents can neither be foreseen, prevented, nor remedied; that under rare conditions no known anæsthetic is entirely free from danger; that the greater comparative safety of sulphuric ether is slowly being recognized, and hence that its use is gradually displacing, to a certain extent, its more potent and more dangerous rival." The relative safety of these two agents, as just expressed, the writer thinks is decided as surely and as firmly by an intelligent and searching experience of half a century as it is possible to decide any scientific point.

As is well known, however, chloroform is to be preferred for certain cases. These the author indicates in a general way, as follows: "All operations liable to be attended with spasm of the glottis, œdema of the larynx or lungs, profuse secretion of fluids in the air-passages, and tonic contraction of the muscles of respiration, all cases requiring tracheotomy and œsophagotomy, as membranous croup; laryngitis, acute, chronic, traumatic, specific, or tubercular; œdema of the larynx or glottis; malignant disease of the throat and neck; deep cervical cellulitis; deep tumors of the neck, as bronchocele; foreign bodies in the air-passages; foreign bodies in the œsophagus; bronchitis in the aged; asthma; and, finally, in cases liable to be complicated by difficult or suspended respiration."

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## ON PENETRATING WOUNDS OF THE SPINAL CORD.

ENDERLEN (*Deutsche Zeitschrift für Chirurgie*, Bd. xl. p. 201), as a result of experimental studies on animals (rabbits), comes to the following conclusions:

1. The degeneration of the spinal cord after a wound is not localized to the point of the lesion, but extends to adjacent parts.
2. The extension of the degeneration is not always uniform; that is, there does not appear to be any rule governing the process; however, the more extensive the lesion, the greater the extent of degeneration.
3. In the course of time the number of swollen axis-cylinders decreases, but they may be found for a comparatively long time (thirty-fifth day).
4. In consequence of the lesion there is an increase in the neuroglia.
5. The gray substance assumes its normal condition in a short time, above and below the wound; there is seen an increase of the ganglion-cells; in the region of the wound these cells degenerate.
6. Independently of the point of lesion there are points of degeneration in the spinal cord, partly on the side of the puncture, and partly in the other half.
7. As regards the arrest of degeneration in the several fibres, it will be found that in many cases the posterior fibres are already free, while in other



tracts there are still swollen axis-cylinders and wide gliameshes. In a few cases the opposite may exist.

As regards the swelling, the author noted its presence two hours after the wound. He could find no instance of regeneration after injury.

The author also injected fresh blood above and below the dura, and also introduced small particles of kidneys beneath the dura, and found degeneration as a result. This he did not think due to pressure, but to disturbance of the circulation, either active or passive.

The clinical part of the paper included 67 collected cases. The lateral swelling and softening of the cord are more extensive than would be supposed on pure anatomical grounds. If certain paralytic symptoms disappear during the progress of the case, it is due to subsidence of swelling and vicarious function of tracts that remain intact.

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#### THE RELATION OF TRAUMA TO MALIGNANT TUMORS.

ZIEGLER (*Münchener med. Wochenschrift*, 1895, No. 27 u. 28) reviews the facts concerning the relation of single and repeated trauma to malignant tumors. His paper is based on the statistics of the last five years in the surgical clinic in Munich. It includes 171 cases of carcinoma of the breast, 44 of the lips, 37 of the scalp, 46 of the cavity of the mouth, 9 of the penis, 9 of the extremities, and 12 of the alimentary canal; 34 sarcomas of the head and neck excluding the jaws, 24 of the jaws, 29 of the mammary gland, 3 of the abdominal wall, 6 of the kidneys, 8 of the testicles, 23 of other parts of the body, and 44 of the extremities. In all there were 328 cases of carcinoma, 117 in men and 211 in women; and 171 sarcomas in 81 men and 90 women. After deducting the tumors of the mamma and genital organs, there were 108 tumors in men and 102 in women. In carcinomas there was a history of single traumas fifty-five times. Ninety-two times there had been chronic conditions of irritation. In sarcomas thirty-five times a single trauma was noted, and thirty-two times (including warts) chronic irritations were at fault. Although some cases of single traumata seem to stand in doubtful relation to the formation of the growth, the author believes, as a rule, the new formation has been brought about by the injury, basing his judgment on the continuation of the pains and swellings after the trauma and which go insensibly into the formation of the tumor.

Such a high percentage for the single traumata, 25 per cent., and for the continuous irritation, 18 per cent., leads Ziegler to adopt Virchow's irritation-theory. In the production of tumors, every factor should be taken into account, and the influence of traumata must be considered, no matter what theory of tumor-formation one accepts.

The subject is of special importance when the relation to medico-legal proceedings and to accident insurance is considered.

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#### ON THE INFLUENCE OF ETHER AND CHLOROFORM ON THE KIDNEYS.

EISENDRATH (*Deutsche Zeitschrift für Chirurgie*, Bd. xl. p. 466) reports 130 cases of narcosis, 70 of chloroform-anæsthesia, and 60 of ether-anæsthesia in which the urine was carefully examined for the presence of albu-

min by heat, nitric acid, acetic acid, ferrocyanide of potassium, and Spigler's test. The centrifugated sediments were examined microscopically. The cases examined were patients without fever, and in whom the urine contained no urates.

In thirteen cases the urine contained albumin before the narcosis; in eight of these there was an increase of albuminuria after the anæsthesia, four times after chloroform and four times after ether. A woman having albuminuria from amyloid kidney was narcotized once with ether and once with chloroform. Both times there was an increase in the amount of albumin, which nearly equalled in each case—from 2.5 per cent. before ether to 10 per cent. after, and from 3 per cent. before chloroform to 9 per cent. after. The increased albuminuria after chloroform lasted longer than that after ether.

In patients whose urine was free from albumin there was albuminuria after ether-narcosis in fifteen instances (25 per cent.), and after chloroform twenty-three instances (32 per cent.). Therefore albumin appeared more frequently after chloroform than after ether. In many cases in which no albumin was found after narcosis, there were found microscopically renal epithelium and cylindriers. This cylindruria was equally frequent after both chloroform and ether (28.3 per cent. of the cases), but it disappeared more quickly after the latter.

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#### JUXTA-ARTICULAR TUBERCULAR FOCI.

To the multitude of forms in which tubercular disease manifests itself in osseous tissue, MENARD (*Rev. d'Orth.*, September, 1895) adds that in which the tubercular focus has its origin in the epiphysis contiguous to an articulation, where it may develop and form an abscess opening externally, without producing an arthritis, or may, and more commonly does, involve the joint, sometimes without a visible destruction of the intervening tissues, and which are never more than slightly affected.

The author cites in detail ten cases involving the extremities of the long bones of both the upper and lower extremity. This form of disease is, however, rare in the hip-joint, probably because of its anatomical relations, and is most common in the extremities of the femur, tibia, and fibula that form the knee-joint.

The treatment indicated is immediate surgical interference, as clinical experience has shown that the opening of the focus of disease prevents the invasion of the joint, and that cicatrization of the original focus is followed by rapid relief and disappearance of any arthritic symptoms that may have been present.

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#### THE TREATMENT OF FLOATING KIDNEY.

After a complete and exhaustive study of the symptomatology of this condition, ALBARRAN (*Annales des Malades des Organes Genito-urin.*, July, 1895) discusses the different modes of treatment and their application to individual conditions, summarizing his remarks in the following *résumé*:

1. Operate upon all floating kidneys which are the seat of other disease, modifying the procedure according to the condition present.
2. Where mechanical or painful exacerbations of the symptoms are pres-

ent, attempt their relief by orthopedic apparatus. If this is successful, give the patient the choice of wearing the bandage constantly or of submitting to operation. Where the bandage does not relieve operate.

3. In cases having hysterical or neurasthenic complications attempt the cure by bandages, and only operate where they do not succeed.

4. Where enteroptosis is present, if the bandage gives relief, do not operate until symptoms directly attributable to the kidney are so serious as to demand operation. Even after operation a bandage should be worn in these cases.

5. Where there are no acute symptoms the bandage is sufficient and should be advised.

#### PERITONEAL TUBERCULOSIS.

THOMSON (*The Practitioner*, November, 1895), in discussing the "Surgical Aspects of Peritoneal Tuberculosis," after having given reasons for discrediting other theories, says: "It does not seem unreasonable to infer that the incision itself is the one constant and essential factor in the curative influence exerted by laparotomy, and that the benefit is due to the surgical interference *per se*, and not to any particular method of interference, nor to any of its incidental accompaniments."

Clinical experience and experimental evidence lead the author to conclude that the beneficial results of surgical interference in peritoneal tuberculosis are due to the making of a wound through the wall of the belly, and the attendant manipulation of the parts concerned.

In discussing the bearing of the above conclusion upon practice, it is not to be assumed that all cases of peritoneal tuberculosis are to be subjected to surgical interference.

In view of the natural tendency to spontaneous recovery, no case should be admitted to operation until medical treatment has had a fair (though not too prolonged) trial. Among the local measures included under this head he is inclined to place most reliance on careful massage of the belly, and on measures calculated to restore the normal functions of the intestine.

The inunction of mercurial or other ointments is probably chiefly beneficial because of the mechanical manipulations concerned, stimulating the tissues invaded by the bacillus to grapple with the latter. The inunction of ointment may be regarded as a gentle and safe form of massage.

The securing of regular and copious evacuations of the bowels by drugs aims at the cure of catarrh, cessation of fermentation-processes, and an increase in the eliminating powers of the mucous membrane. Should evidences of recovery not present themselves the question of operation is to be considered.

In all cases of diffuse serous or purulent ascites operation is very certain to cure and very easy of performance; a free incision is to be made through the belly-wall, the fluid is to be evacuated as completely as possible (turning the patient on one or other side for this purpose). When the fluid is serous the wound is then and there to be closed by suture; it being optional and perhaps advantageous to insert some iodoform into the parts exposed by the incision, rather with the object of preventing tubercular infection of the



tissues of the abdominal wall and consequent breaking down of the scar at a subsequent period, than of influencing the existing peritoneal tuberculosis.

When the fluid is purulent (cold abscess) it is better to insert a drainage-tube within the lips of the wound, and to remove it on the second or third day, when the amount of discharge is no longer sufficient to soak the dressings. To leave in a drainage-tube longer is injurious, as on the one hand it favors the formation of a sinus, and on the other its inner end may, by its mechanical pressure on the weakened walls of the intestine beneath, favor perforation of the latter and formation of a fecal fistula.

In cases of encysted or circumscribed fluid the consensus of opinion points to operative interference as especially indicated in this group, and experience has shown that it is in the majority of cases remarkably successful.

The author concludes from five personal cases and the experience of others that the adhesive type of tubercular peritonitis, while less favorable than the cases in which fluid accumulation is the chief feature, are capable of being favorably influenced by laparotomy, provided there is no serious tubercular lesion elsewhere in the body.

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#### HYPERTROPHY OF THE PROSTATE WITH COMPLETE AND CHRONIC RETENTION. DOUBLE CASTRATION. CURE.

ALBARRAN (*Annal. des mal. des organes genito-urin.*, August, 1895) reports the following case: Patient, sixty-nine years of age, having good family history, had had four attacks of gonorrhœa. For the past four years he had urinated more frequently than formerly, getting up once or twice in the night. Since the accentuation of this difficulty the patient has been compelled to strain for a considerable time before the urine began to flow. In June of 1894 he had his first retention of urine, which lasted for twenty-four hours. Since that time the number of micturitions had been increased, thirteen times a day, four or five times a night, while the urine has become turbid. In the latter part of December two hypogastric punctures were necessary to relieve him of retention, and subsequently he has been obliged to use the catheter regularly, occasionally passing a small quantity. Catheterism became difficult at the beginning of June.

Condition at the time of operation: The urethra is not markedly indurated or irregular in the penile portion, but the prostatic portion is elongated. The bladder is insensible, though extending to the umbilicus. Rectal palpation showed a moderately hypertrophied prostate, smooth, without irregularities, sluggish to the touch. A soft catheter could not be passed into the bladder. The urine was turbid, contained a slight amount of pus, but no casts. The general condition of the patient was medium, but he had no fever and very little appetite. Regular catheterization with lavage produced very little marked improvement in ten days' time.

The afternoon of the day of the operation the patient passed spontaneously 20 grammes of urine. The next day 200 grammes, then 400, 600, until on the seventh day he passed 1500 grammes. The amount of residual urine after spontaneous urination was on the eighth day 300 grammes, on the eleventh day 180 grammes. From the thirteenth to the twenty-first day it was between 135 and 150 grammes. On the twenty-fourth day it fell to 25 grammes. Since then it has remained between 16 and 20 grammes.

The patient left the hospital on July 29th. He urinated five or six times a day, and once in the night. The residual urine was only 15 grammes. The prostate had diminished about one-fifth of its volume. A soft catheter could be easily passed.

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#### LIGATURE OF THE INNOMINATE ARTERY.

BURRELL (*Boston Med. and Surg. Journ.*, August 8, 1895) reported a rare case of ligation of the innominate artery in which the patient lived 104 days after operation. He had been up and about for a number of weeks attending to his affairs, and died of hypertrophy and dilatation of the heart and general arterial sclerosis. The innominate artery was closed and the aneurism had shrunk. The patient might have lived for a long time, so far as the ligation of the innominate was concerned.

The author believes that this case teaches :

1. That a patient with general arterio-sclerosis and an enlarged and dilated heart may be kept under ether an hour and a half, subjected to a severe operation, and recover with little shock.

2. That while the ligation of the innominate artery is not of necessity fatal, yet it will always be an extraordinary operation, fraught with danger from the cutting off of an extensive area of circulation. The removal of the sterno-clavicular articulation, and such a portion of the sternum as may be necessary, makes the performance of the operation more practical and one of relative simplicity and safety.

3. That the absence of pain or marked discomfort following the operation, the complete relief of all the patient's symptoms, and his almost uneventful recovery are remarkable.

4. That the secondary hemorrhages which have occurred in almost all of the recorded cases were undoubtedly due to local sepsis, and that the recovery of this case was due to the accuracy with which it was possible to place the ligatures and to the asepsis.

5. That if the innominate is ligated at all, two ligatures are necessary, one to act as a breakwater by obstructing the constantly recurring waves of blood coming from the aorta.

6. That the collateral circulation was principally established in this case by a downward stream of blood from the right carotid and vertebral arteries into the subclavian artery. That while the fusiform aneurism had shrunk there was very little clot above the second ligature. This would lead him in another case of fusiform aneurism in this situation to ligature the carotid, if possible the subclavian in its first part, and, if practical, the vertebral.

7. That the unique behavior of the first ligature that was applied to the innominate is perhaps the most interesting fact which we learn from this case. When the innominate artery was tied something in the wall was felt to give way. The ligature gradually cut its way through the coats of the vessel, followed by an inflammation in the organization which prevented a secondary hemorrhage, and finally rested, organized, and probably covered with a smooth layer of intima inside the innominate artery. This places a new factor at our disposal as regard final disposition of the ligature.

## OBSTETRICS.

UNDER THE CHARGE OF

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## THE EFFECT OF ALCOHOL AS A DISINFECTANT IN OBSTETRIC PRACTICE.

In the *Deutsche medicinische Wochenschrift*, 1896, No. 6, AHLFELD and VAHLE describe experiments made to ascertain the value of alcohol as a practical disinfectant in obstetric practice. These experiments are in addition to some which they had previously made.

The results obtained by disinfecting the hands with alcohol have been variously assigned to the solvent properties of alcohol upon the fatty tissues, thus allowing bichloride of mercury and other antiseptics to come into immediate contact with bacteria contained upon the fingers. Others have asserted that alcohol does not destroy bacteria, but coagulates the epithelia of the skin, thus hardening them without preventing the passage of germs. It has been found, however, that alcohol destroys bacteria, but that its most efficient action is exerted upon micro-organisms which themselves contain water, or which are found in tissues containing water. By experiment Ahlfeld found that alcohol does not act simply by dissolving fatty substances upon the fingers, because ether, which is a better solvent of fat, is not so efficient as an antiseptic. Experiments with septic germs proved that alcohol exerts a direct influence in destroying virulent streptococci. Upon dried tissues containing bacteria, and upon bacteria from which water had been removed, alcohol exerted but feeble influence. An experiment was made with amniotic membrane to determine the influence of alcohol upon such tissues when wet and when dry; the result demonstrated in a striking manner the prompt action of alcohol when the membrane was moistened. Experiments upon the hands of attendants and nurses demonstrated clearly the value of alcohol as a disinfectant.

## BULLET-WOUND OF THE PREGNANT UTERUS.

PRICHARD, in the *British Medical Journal*, 1896, No. 1832, reports the case of a patient, seven months advanced in pregnancy, who was shot with a revolver in the abdomen. She was admitted to the Bristol Infirmary two and a half hours afterward, in a condition of collapse. The bullet entered three inches above and two inches in front of the right anterior superior spine. There was little hemorrhage and no great distention of the abdomen. The fetal heart was easily heard. A probe would not pass through the abdominal wall. There was no distinct evidence that the bullet had penetrated the abdomen. Later in the evening the bullet was found half an inch above and five inches behind the left anterior superior spine, and was ex-



tracted under cocaine. As the patient's pulse was increasing in quickness, and the distention of the abdomen was greater, abdominal section was performed. The uterus was found to have been shot through, and accordingly was opened, and a dead fetus and placenta, both perforated by the bullet, were removed. The uterus was amputated, and the pedicle fixed outside the abdomen at the lower end of the wound. Three coils of small intestine had been perforated; these were closed with silk suture. An artery in the mesentery had been severed, and required ligature. The peritoneal cavity was emptied of blood and clots, and thoroughly washed out with boric solution. Drainage with gauze and a glass tube was employed. The patient survived six days and twelve hours. She had bowel-movements, and a sanguinous fluid, which became purulent, was removed from the drainage-tube. At the autopsy death had resulted from purulent peritonitis in three or four foci, the worst being inside the wound of exit. The intestines were completely sealed. The pedicle was also in good condition. The peritoneum had evidently become infected by the bullet after passing through the intestine. Examination of the body of the fetus showed that the shot passed through the pleura, diaphragm, and liver.

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#### RUPTURE OF SAC AND DEATH OF FÆTUS IN ABDOMINAL PREGNANCY AT FULL TERM, FOLLOWED BY RECOVERY.

EAGLESON reports in the *Journal of the American Medical Association*, 1896, No. 8, the case of a woman, aged thirty-six years, who supposed that she had an abortion at three months, because she suffered from pain, hemorrhage, and the expulsion of a membranous cast of the uterus. This was followed by the development of an enlargement on the right side of the uterus, the true nature of which was not appreciated. Fœtal movements were finally felt, and the heart of the child was heard. She came under Eagleson's observation supposing that she was in labor. The patient's urine contained a large amount of albumin, and she gradually developed eclampsia. It was decided to dilate the uterus and deliver immediately. When the cervix was dilated, the uterus was found empty and but little enlarged. It was evident that the pregnancy was extrauterine. The patient was transferred to the Providence Hospital at Seattle, and abdominal section performed as soon as possible. A dead child was extracted, which had evidently perished some days previously. It was well formed, weighing six and three-quarters pounds. There were but few adhesions of the fetal sac, and these were easily separated. The placenta was firmly attached to the top and posterior surface of the uterus, and to the right broad ligament. The principal nutrient vessel of the placenta, as large as a small lead-pencil, came from the under surface of the mesentery of the ileum. Commencing peritonitis was present. The abdominal cavity was thoroughly washed with hot boiled water, and a glass tube and gauze drain were inserted. The patient made a good recovery.

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#### THE INFLUENCE OF TOXINS UPON FÆTAL DEVELOPMENT.

CHARRIN and NOBÉCOUR, in the *Archives de Physiologie*, 1896, No. 1, give the results of interesting observations upon infants born of mothers who had

developed some pathological condition during pregnancy, giving rise to the formation of toxins in the blood. It was found that whereas a healthy child increases thirty-two grammes each day, an infant born of a tuberculous mother did not gain in weight at all, while the child of a woman who died of tubercle had increased 4.28 grammes for each day. The child of a mother who before confinement had a very extensive phlegmon gained but 5.7 grammes for each day. Experiments upon animals give similar results. The healthy infant loses but a moderate amount through the organs of excretion, while, on the contrary, toxins interfere with processes of nutrition, and often seem to reduce a discharge of harmful waste to a minimum.

#### ABNORMAL LABOR-PAINS AND THEIR TREATMENT.

SCHAEFFER, of Heidelberg, divides abnormal labor-pains into those which are purely atonic and those which are partially spasmodic in their character. There have been various divisions made of atonic pains, some referring them to the various portions of the uterus, and others dividing them according to the degree of atony which is present. The uterus contracts more frequently when atony is present, but much less effectually. Such pains do not increase in vigor as dilatation advances. The pauses between these pains are shorter than in normal cases. In the latter portion of the period of expulsion atonic pains are more frequent and longer than in normal cases, so that in some patients the same effect is produced, although in longer time, which is obtained by normal pains. The amount of actual work done by the uterus is found by careful observation to be much greater than in cases of normal contraction. The work done by the uterus is most efficient in the first portion of labor; while compensation is wholly or largely effected in the latter part. It is observed that the latter portion of birth in these cases is practically accomplished by contraction of the abdominal muscles, and that these contractions are greatly influenced in a reflex manner by uterine pains. The diagnosis of atonic pains is often neglected, and this condition is mistaken for other complications.

In partially tetanic pains there is no special delay in the rupture of the membranes. The most frequent cause of this condition is endometritis of the cervix, resulting in slow dilatation and increased suffering. Another cause of this condition is frequent examinations during labor, and the irritation which they produce. An abnormal position of the uterus may also produce partially tetanic contractions. The treatment of this condition consists in placing the patient in a favorable posture, in the use of warm baths, and in hot vaginal douches.

For weak pains, where simple atony of the uterus is present, small doses of ergotine, given by hypodermatic injection, are found useful. It was observed to produce an effect in about eight minutes after its administration.—*Centralblatt für Gynäkologie*, No. 4, 1896.

#### THE CLINICAL IMPORTANCE OF GONORRHOEA DURING PREGNANCY, LABOR, AND THE PUERPERAL STATE.

In the *Münchener medicinische Wochenschrift*, 1895, No. 49, FEHLING draws attention to the various ways in which gonorrhœa can affect the childbearing

woman, and makes suggestions regarding her treatment. He has seldom found it necessary to treat urethritis occurring from this cause. The patient is directed to drink an abundance of water, and occasionally salicylate of sodium or salol is given. In obstinate cases iodoform-bougies are placed within the urethra. Where vulvitis and vaginitis are present, antiseptic injections produce good result. Normal saline solution and permanganate of potassium are useful in the form of douches. Twice weekly Fehling is accustomed to pencil the mucous membrane with 5 to 10 per cent. solution of nitrate of silver, using iodoform as a powder. Absorbent cotton should be placed between the labia, or compresses wet in lead-water. Where erosions are present upon the cervix nitrate of silver may be used with a camel's-hair pencil. Gonorrhœal salpingitis is treated in the usual manner, by rest, counter-irritants, and morphine. Scarification of the neck of the uterus is sometimes practised where pain is excessive.

Should it be necessary to induce labor in a patient having gonorrhœa, it is well to douche the vagina with normal saline solution, or with an antiseptic if the infection be in an acute stage. In cases where there have been erosion and catarrh of the cervix for a long time, the tissues are rigid and dilatation slow. Douches are often of value; multiple incisions are often required in these cases. No alteration in the placenta has been observed in gonorrhœal patients. Care must be taken with children to use prophylactic applications of nitrate of silver to the eyes. Gonorrhœal stomatitis is rarely seen in private practice, although described in hospitals. Absorption-fever is not infrequent in these cases, and is best treated by vaginal douches; after the first four weeks occasional applications of nitrate of silver are advised to the interior of the uterus. Fehling considers salpingitis not common in these cases, and draws attention to the danger that such a condition will go on with but little apparent disturbance until an abscess in the tube may suddenly rupture, setting up peritonitis. Fehling believes that in the greater portion of cases of gonorrhœal tubes that the contents of these tubes does not contain pathogenic micro-organisms aside from the gonococcus.

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#### DOUBLE OVARIOTOMY DURING PREGNANCY.

In Landau's clinic in Berlin, MAINZER (*Münchener medicinische Wochenschrift*, 1895, No. 48) reports the case of a primipara, four months pregnant, who suffered greatly from pain in the sacral region. Upon examination a tumor was felt, not connected with the uterus, upon each side of the pelvis. These were found to be ovarian and were removed without the interruption of the pregnancy, the patient going to term and being delivered of a healthy child in spontaneous labor.

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#### GONORRHOEAL RHEUMATISM IN THE PUERPERAL STATE.

This rare complication of the puerperal state is illustrated in a case described by BAR (*La Presse Médicale*, 1895, No. 60). The patient was suspected of having had gonorrhœa before labor, and bacteriological examination was made of mucus taken from the vagina. Although gonococci were not found, epithelial cells and other micro-organisms were present. As the gonococcus often disappears in the later stages of gonorrhœa, its absence was not proof



positive against the diagnosis of gonorrhœa. The patient was confined in normal labor, having been seized a few days previously with chills and intense pain in the joints. The articulations were swollen, and over the surface there was an erythematous eruption. The mother's lying-in period was without septic infection, although her joints were successively attacked by pain, swelling, and redness. An examination of mucus from the urethra showed the presence of gonococci. One of the affected joints was aspirated, and its contents allowed to develop upon culture-material, when streptococci and staphylococci were found in colonies. The patient made ultimately a good recovery.

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#### A SUCCESSFUL SYMPHYSIOTOMY.

CAMERON reports in the *Montreal Medical Journal*, 1895, vol. xxiv. No. 6, a successful symphysiotomy in a woman in her second labor. Her first confinement was terminated without especial difficulty, by forceps, with the birth of a small female child. At her second labor the head of the child was very large and firm, and failed to engage at the brim of the pelvis. Axis-traction forceps were used without success. The symphysis was then opened with an ordinary scalpel. The head was then extracted by forceps, considerable force being required. Both walls of the vagina were lacerated, but immediately sutured with silkworm-gut. The child weighed eleven and a half pounds, and survived the operation. The patient also made a good recovery. Six months after the operation the patient was in good health, and walked without difficulty. The symphysis had firmly united.

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## GYNECOLOGY.

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### UNDER THE CHARGE OF

HENRY C. COE, M.D., M.R.C.S.,  
OF NEW YORK.

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#### PRURITUS VULVÆ.

MARAIN (*Revue internat. de Méd. et de Chir. pratiq.*; *Centralblatt für Gynäkologie*, 1895, No. 49) recommends local applications of warm chloral solution (1 per cent.) twice daily, 10 per cent. solutions of chloral, corrosive sublimate, 1 to 500, and an ointment containing one part of olive oil, three of menthol, and six of lanolin. If these are not beneficial, the galvanic or faradic current may be applied. Excision of the affected parts is a last resort.

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#### GONORRHOËAL METRITIS.

MADLENER (*Centralblatt für Gynäkologie*, 1895, No. 50) affirms that the gonococcus is able to make its way from the endometrium into the muscular substance of the uterus and to cause inflammation there, which may terminate in abscess-formation. The latter is especially apt to occur during

the puerperium. The inflammatory process is usually localized. The cocci soon disappear from the myometrium, where it is destroyed, or whence it emigrates. The germs may penetrate the entire thickness of the muscular wall and infect the peritoneum without the tube being involved, which explains the occasional occurrence of perimetritis as a sequela of gonorrhœa without accompanying disease of the adnexa.

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#### REPEATED OPERATIONS IN ADHERENT TUMORS.

JABOVLAY (*Lyon m d.*; *Centralblatt f r Gyn kologie*, 1895, No. 52) recommends that in the case of tumors, so firmly adherent that their immediate removal would be attended with too much risk, a preliminary operation should be performed at which the adhesions are separated sufficiently to allow the tumor to be drawn out of the wound as in draining an adherent sac. A week later the tumor is removed.

[The description of this method is somewhat vague, and does not make clear the advantages of a second operation.—H. C. C.]

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#### MYOMA OF THE RECTUM SIMULATING OVARIAN CYST.

WESTERMARK (*Centralblatt f r Gyn kologie*, 1896, No. 1) reports a case of tumor of the rectum which was diagnosed as ovarian cyst, the error not being discovered before operation. The patient died of ileus, due to intrapelvic adhesions of the intestines, which the writer attributes to the use of the gauze drain. Similar errors in diagnosis were reported by Senn and Berg.

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#### PERFORATION OF THE UTERUS.

TAIT (*Lancet*, August 10, 1895) strongly opposes the idea that in many cases in which the uterine wall is apparently perforated with a sound or curette the end of the instrument really enters the dilated proximal end of a tube. In all his experience he has never seen such a condition in either the normal or pathological Fallopian tube; while, on the contrary, he states that he has observed several specimens in which the uterine wall has become so thinned that it was readily perforated with a sound. Five cases were observed by him in which this accident occurred without untoward results.

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#### INTESTINAL OBSTRUCTION AFTER C LIOTOMY.

FERGUSON (*Journ. Amer. Med. Assoc.*, 1895, No. 15) reports the case of a patient, aged thirty-seven years, who developed symptoms of ileus four days after double salpingo-o phorectomy and ventro-fixation. Two days later the abdomen was opened and a loop of small intestine was found adherent to one stump. This was detached, and the patient made a good recovery.

LEGUEN (*Gaz. M d. de Paris*, 1895, No. 35) reports four cases of intestinal obstruction following abdominal section, the first of which, due to compression of the colon by a perimetric band, terminated fatally. Autopsy in the second case showed an entire absence of adhesions, obstruction being due simply to paralysis of the gut. In the third a secondary c liotomy showed the presence of adhesions between the stump and the colon; in the fourth the

intestinal canal was obstructed by a vaginal tampon(!). The writer recommends the administration of laxatives on the day following operation. If symptoms of intestinal obstruction appear, the abdominal wound should be promptly re-opened and the point of occlusion sought for, especially in the neighborhood of the stump. If it cannot be found, an artificial anus should be established.

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#### VAGINAL HYSTERECTOMY FOR IRREDUCIBLE INVERSION.

FRANCHOMMES (*Journ. de Sciences Méd. de Lille; Centralblatt für Gynäkologie*, 1896, No. 1) affirms that total extirpation is the most surgical method of dealing with this condition. Two successful cases by Dures are reported, of four and seventeen months' standing. On account of the difficulty of ligating the broad ligaments he recommends opening the peritoneal cavity at once, introducing the finger, and then splitting the anterior uterine wall. The edges of the latter wound are held apart and the broad ligaments are drawn through it, ligated, and divided. The posterior wall of the uterus is then incised, and, lastly, the lateral vaginal fornices. After securing the bases of the broad ligaments the uterus is removed in halves.

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#### UNIQUE VARIETY OF OVARIAN CARCINOMA.

V. KAHLDEN (*Centralblatt für Allg. Pathologie; Centralblatt für Gynäkologie*, 1896, No. 1) describes an ovarian neoplasm removed from a young girl, which seemed to have originated from the epithelium of the Graafian follicle. Histologically it showed a large number of small round bodies closely resembling primordial follicles. It could be characterized as an adenoma of the Graafian follicle, without any tendency to cystic formation, from which carcinoma developed by atypical proliferation.

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#### THE EARLY DIAGNOSIS OF CANCER OF THE UTERUS.

In a recent discussion on this subject (*British Med. Journal*, February 1, 1896), THORNTON lays stress on the responsibility of the general practitioner with regard to the early recognition of malignant disease of the uterus. Important clinical symptoms are the characteristic sacral pain, offensive discharge, and cachexia, "which is often only too apparent quite early." Locally the presence of red, angry nodules in the cervix, which bleed easily and later break down, forming little pits with grayish surfaces and covered with necrotic tissue, is significant. Excision of a bit of suspected tissue for microscopical examination (if a suspicious ulceration fails to heal under the usual applications) should not be resorted to unless absolutely necessary, or unless an operation is to follow shortly, as there is "risk of rapid spread to distant parts through the opened veins and lymphatics."

GRIFFITH (*Ibid*), writing on the same theme, analyzes some of the salient symptoms of early uterine cancer. Hemorrhage, he affirms, is atypical, having no connection with menstruation, except in cases of corporeal disease. Menorrhagia, if present, is usually due to some other cause. A slight hemorrhage without any assignable cause is always significant, especially in a patient not pregnant (or one who has recently aborted or been confined), and



in a woman after the climacteric. The pain of cancer differs from that due to other pelvic troubles in that it is not relieved by rest in the recumbent posture, but is often increased. It is more frequently referred to the region of the trochanters than are other pelvic pains. Vaginal discharge is a late manifestation, and is watery, rarely purulent. In making a different diagnosis it is important to bear in mind the ulceration of the vagina and cervix in working women, due to neglected prolapsus and foreign bodies (pessaries). Hemorrhagic endometritis may simulate commencing malignant disease of the corporeal endometrium. The tendency of a malignant ulcer to bleed at the slightest touch is highly important clinically. Hysterectomy may be performed in doubtful cases, even where the diagnosis of cancer is afterward found to have been erroneous. This is better than to delay radical operation until too late.

[Although the points raised in this discussion are quite familiar, we have thought it useful to cite the views of these well-known specialists in order to emphasize certain errors which we believe should be pointed out. To me, who has made a study of the subject, it is evident that all the symptoms mentioned as characteristic may be absent until a late stage, especially pain, foul discharges, and above all *cachexia*. Moreover, menorrhagia has been frequently noted as an initial symptom in young women, though atypical hemorrhages in patients after the climacteric are most significant. Again it is frequently demonstrated practically that the microscope is not always a reliable guide in the diagnosis of malignant disease. These facts cannot be too strongly insisted upon, because the general practitioner is too often lulled into a feeling of security by noting the absence of those typical symptoms which he has been led to believe are invariably present in incipient malignant disease. The history of the majority of cases of inoperable carcinoma of the uterus submitted to the specialist bear out this statement.—H. C. C.]

#### THE SURGICAL TREATMENT OF LARGE UTERINE FIBROIDS.

WALTHARD (*Correspondenz-Blatt für Schweizer Aerzte*, 1896, No. 4) concludes a theoretical paper on this subject, based on experiments on animals, as follows: Secondary hemorrhage in supravaginal amputation is certainly avoided by careful ligation of the ovarian and uterine arteries, with transfixation and ligation of the stump. There is no danger of the stump sloughing if it is tied with catgut or silk. Infection of the cervical stump does not occur from the migration of organisms in the vagina. Ileus is avoided if irritation of the peritoneum (bacterial, chemical, or mechanical) is avoided during the operation, and if all non-absorbable ligatures are made extra-peritoneal by stitching peritoneal flaps over the stump.

#### DRAINAGE OF THE PERITONEAL CAVITY.

GUBAROFF (*Ibid.*) concludes from personal observations that gauze is the best drainage material, the indications for the use of tubes being "more than doubtful." He admits that the Mikulicz drain is essentially a hæmostatic. The earlier the gauze is removed the better. If the fluid which escapes is colorless and there is no febrile reaction, it may be removed at the end of twenty-four hours.

## PÆDIATRICS.

UNDER THE CHARGE OF

LOUIS STARR, M.D.,  
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ASSISTED BY

THOMPSON S. WESTCOTT, M.D.,  
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## TREATMENT OF INFECTIOUS VULVO-VAGINITIS.

AGRAMONTE (*Medical Record*, January 11, 1896) reports a series of thirty-two cases of vulvo-vaginitis in children coming under his observation at Bellevue Hospital. In treatment he properly deprecates any medicine by the mouth, unless it be a mild diuretic, like citrate of potash, or drugs properly addressed to a remote cause or underlying dyscrasia. Enuresis, which he places among the more frequent etiological factors, must, of course, receive appropriate treatment. Whether the urethra be involved or not, the author's routine treatment is directed to the vaginal canal and external parts only; this consists simply of flushing with a solution of permanganate of zinc or potassium (preferably of zinc), of the strength of 1 to 3000. The mother is instructed (the first time practically taught) to insert into the vaginal canal, for a distance of one or two inches, a soft rubber tube of a thickness appropriate to the age of the child, the other end being connected with a fountain syringe or by siphon with an ordinary bottle; the reservoir being lifted one foot or eighteen inches only above the level of the table, the fluid is allowed to flow into the canal. The vulvar orifice is compressed at intervals to produce a distention of the vaginal walls, and thereby allow the liquid to come in contact with every portion of the inflamed area. An ordinary piece of soft drainage-tubing should be used, and never the closed end of a rubber catheter with orifices on the sides. The two cases complicated by cystitis were treated under the author's immediate supervision by intra-vesicular irrigations with a 1 to 6000 solution of the same drug. Excluding these two cases, which took respectively 5 and 8 weeks to recover completely, the average time required to cure the other consecutive 30 cases was only  $12\frac{1}{2}$  days from the time of onset, which in some few cases was even two weeks before treatment was sought.

## SUFFOCATIVE LARYNGITIS IN VARICELLA.

MARFAN and HALLÉ (*Revue mensuelle des Maladies de l'Enfance*, January, 1896) record two rare instances of severe laryngitis, one preceding, the other accompanying the appearance of a varicellous exanthem. The first case, an infant of three years, was brought under observation after an illness of three days' duration. The voice was hoarse and respiration difficult, with supra- and infra-sternal depression. The fauces were reddened, but in other respects showed no abnormal condition. After twenty-four hours an injec-

tion of 20 cubic centimetres of antidiphtheric serum was made and cultures taken. That same evening the first vesicles of varicella appeared upon the surface. The laryngeal symptoms increased, and on the following day called for tracheotomy. The first cultures from the throat, and later ones made directly from the trachea by way of the canula, demonstrated the absence of the Loeffler bacillus. After three days the canula was removed, and the case went on to complete recovery.

The second case occurred in a weakly infant of nine months. When brought to the hospital, with marked symptoms of laryngeal obstruction, a profuse confluent varicella eruption was noticeable. The throat was free from false membrane and was scarcely reddened, while no trace of vesicles was found upon the buccal mucosa or upon the pillars and uvula. This case also was regarded as probably one of primary laryngeal diphtheria complicating varicella, and an injection of antitoxin was made by Roux. Cultures taken at the same time subsequently showed the absence of diphtheria-bacilli. Death occurred on the seventh day from acute diarrhœa and broncho-pneumonia. The autopsy showed a small, round, deep ulcer at the posterior part of the margin of the right vocal cord.

These two cases of varicella of the larynx determined a stenosis giving the clinical picture of a true croup, and are in the authors' opinion unique examples. The only case of varicella involving the larynx previously reported is that recorded by Boucheron in his thesis ("Étude sur les complications respiratoires de la varicelle et relation d'un cas de varicelle du larynx," Paris, 1893), in which the affection took the aspect of a spasm of the glottis without symptoms of laryngitis. The case terminated fatally by suffocation during an access of the spasm.

The authors conclude that involvement of the larynx in varicella occurs early, about or shortly after the appearance of the eruption, a point that serves to distinguish it from secondary and unrelated infections. Anatomically this laryngitis is characterized by small ulcerations, circular, few in number, seated usually upon the true cords. About these ulcers the mucous membrane may be the seat of hyperæmia, more or less intense and extended. These two lesions explain the two forms under which the complication occurs, as is shown by the authors' cases on the one hand, and by Boucheron's on the other.

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#### INFANTILE INTUSSUSCEPTION AND ITS TREATMENT.

FREDERICK HOLME WIGGIN (*Medical Record*, January 18, 1896, p. 83) presents some interesting statistics of this condition and its treatment drawn from the study of 103 cases collected from the literature. Nearly 50 per cent. occurred during the fourth, fifth, and sixth months, in nearly equal proportions; 75.4 per cent. of the cases occurred in males; and 89 per cent. were of the ileo-cæcal variety. Abdominal tumor was seldom absent, as was to be expected in such a large proportion of cases of the ileo-cæcal variety. Several of the reporters called attention to the necessity, in all suspected cases of this trouble, of making a conjoined abdominal and rectal examination, for in some instances a tumor was revealed by this means after abdominal or rectal palpation alone had failed to discover it. A protruding anal tumor occurred in the usual proportion—about 6 per cent. of the cases.



Thirty-nine of the cases were treated only by means of inflation, or enemata, or both. Of these, 16, or 41 per cent., recovered. The average hour after the onset when the treatment began was the forty first.

Of cases in which laparotomy was performed 64 were collected, 21 of which, or 32.8 per cent., were successful, the average age of the infants being  $6\frac{1}{2}$  months. In 17 of the cases inflation and enemata, or both, had previously been tried without success. If from the total number of cases those are eliminated in which either the operation was abandoned, the bowel incised and an artificial anus made, or resected and an anastomosis effected, there are left 45 cases, of which only 24 resulted fatally, reducing the mortality to 53.4 per cent.

If again only those operations are counted that have been performed since the perfected technique of abdominal surgery has become generally known, say since 1889, there results a total of 18 cases, of which 14 were successful and 4 unsuccessful, or a mortality of only 22.2 per cent., which the author believes is a fair estimate of the risks of abdominal section to-day performed on a young infant for the relief of this disorder, if done within the first forty-eight hours after onset.

As a final commentary upon his statistics, the author thinks that if their testimony be carefully weighed it would not be long "before we should come to look upon the treatment of this disease by enemata of air and water, much as we do to-day upon the pukes, purges, doses of metallic mercury, of gold and silver balls, of mixtures of bird-shot and olive oil, and bloodletting, which were soberly employed by good men not so many years ago for the relief of this distressing disorder."

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#### SALPINGO-OVARITIS FOLLOWING VULVO-VAGINITIS IN CHILDREN.

MARX (*Revue de Thérapeutique Médico-chirurgicale*, May 1, 1895) calls attention to the dangers of a blennorrhagic vulvo-vaginitis in little girls. As in the adult female serious complications of the disease may arise, such as urethritis, purulent cystitis, and even involvement of ureters and kidneys; while, through the uterus, the tubes, ovaries, and peritoneum may participate in the infection. By rectal examination in some cases the author has been able to detect an effusion in the lateral cul-de-sacs, and in several cases he believes he has encountered suppurative salpingitis with ovaritis. In autopsies upon girls of seven to nine years of age he has five times found pus encysted in the tubes. Even if mischief does not become evident at once, disease of the adnexa is likely to appear later in life, and menstruation will be established with great difficulty.

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#### MORPHINISM IN CHILDREN.

MATTISON (*Transactions of Section on Pædiatrics, New York Academy of Medicine*, October 10, 1895, from *Pædiatrics*, January 1, 1896, p. 31) believes that chronic opium-poisoning is not very uncommon in childhood. One of the cases cited is worthy of quotation: A baby of seven months when first seen presented the shrivelled and wrinkled appearance of an old man, and attracted attention by its peculiar solemn manner. The child had been perfect at birth, and had thrived up to the age of four months, when, in order to quiet

it when fretful, it was given paregoric. It very soon became necessary to give laudanum, and to increase the dose, so that when first seen by the physician it weighed only seven pounds, and was shockingly emaciated and extremely weak. It was taking at this time no less than one ounce (!) of laudanum daily. The laudanum was reduced one drop at each dose, and at the end of one month the child had become plump and well again. In the author's experience children had shown a very strong tendency to become victims of morphinism. The consequences of the habit in children were decline and death, unless promptly treated. Prognosis is good if there be no structural lesion and nutrition has not been too greatly impaired. Abrupt withdrawal of the drug is not to be thought of, but gradual reduction of the dose, together with general tonic measures, constitutes the whole treatment.

Dr. E. A. Tucker stated that he had seen one case of congenital morphinism in hospital. It was the offspring of a mother who for several years previously had been addicted to taking morphine and also to smoking opium. At birth the child appeared to be perfectly healthy, but when handed over to a wet-nurse it began to lose ground rapidly. This he attributed to the sudden removal of the baby from the influence of the morphine to which it had been subjected in utero. In a similar case he would advise the use of small doses of morphine for a few days after birth, and then gradual withdrawal.

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#### A SERIES OF CASES OF MULTIPLE NEURITIS IN INFANTS.

HAMMOND (*Medical Record*, November 9, 1895, p. 656) gives the histories of ten cases of multiple neuritis occurring among children in the city of Bridgeport, Connecticut, within a period between December, 1894, and October, 1895. The ages of the children varied from four and one-half months to four and one-half years. Eight of the ten cases began in the warm weather of June and August, and thus confirm the experience of Medin and Saelis. In three cases both arms and both legs were paralyzed; in two cases both legs and the right arm were affected; in four cases only the legs were implicated; and in one case the intercostal muscles were the primary seat of paralysis. Two of the cases presented typical symptoms of meningitis—one, aged twenty months, recovering; the other, an infant of four and one-half months, dying after a lapse of one month, but, unfortunately, it was not subjected to post-mortem examination. The succession of cases within a limited geographical area and their great similarity point to a common cause of origin. In one case the bacillus of influenza was found in the blood, and in two others the blood showed the characteristic evidences of malaria, but this proves nothing, since gripe and malaria are common among infants; but such a series of cases as are here reported is almost unique.

The second case, in a little daughter of a physician, occurred in a house about a hundred yards from that in which the first case developed; six other cases occurred in the practice of one physician of the city; and another in the practice of the father of the child designated above as the second case. While by no means conclusive, these coincidences suggest the possibility of the communication of a contagion through the series of cases. This point, however, is not raised in Dr. Hammond's paper, but is a natural conclusion from a study of the cases which he here records.

## PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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THE DIAGNOSIS OF NEOPLASMS FROM MICROSCOPIC EXAMINATION OF  
TRANSUDES.

In cases of suspected tumor of the hollow viscera, such as the stomach or bladder, and of the tissues bordering on the larger body-cavities, the pathologist is not infrequently requested by the clinician to determine from an examination of the contained liquid whether or not a neoplasm be present. The difficulties attending the decision of this question are rarely appreciated by the clinician, whose confidence in the ability of the pathologist to distinguish pathological cells of various origin from one another and from the normal cells of the body is often surprising. It has been frequently necessary to remind him that it is only exceptionally, when fragments of tissue are present, in which the relation of the cells to the stroma can be detected, that any very positive conclusion can be arrived at.

In this connection much interest attaches to the report by HERMANN RIEDER (*Deutsches Archiv f. klin. Medicin*, liv., 1895, p. 554) of a case of tumor of the peritoneum in which the diagnosis of neoplasm was made from a study of the cells contained in the peritoneal fluid, not as the result of finding portions of the tumor-mass.

The patient was a woman, forty years of age, who had enjoyed good health until three weeks before her appearance at the hospital in Munich, at which time her only symptoms seem to have been loss of appetite, pain in the abdomen after the ingestion of solids, ascites, and emaciation. Physical examination left the diagnosis between cirrhosis of the liver, obstruction of the portal vein, and peritoneal tumor uncertain. Examination of the sediment obtained from four litres of peritoneal fluid removed by paracentesis led Rieder to the diagnosis of neoplasm, which was subsequently verified by autopsy.

The diagnosis was based upon the presence in the fluid of many polymorphous cells of various sizes, mono- and polynuclear, many of them vacuolated, and some of them showing evidences of active cell-division. Similar cells were found in the fluid obtained at subsequent tapplings from the abdomen and left side of the chest. During the entire course of the case no tumor of any kind was discoverable on palpation.

The appearance of the cells which led Rieder to diagnosticate a malignant growth is well shown in two plates which illustrate the article, and which should be consulted for a clear picture of their peculiarities. The points upon which emphasis is particularly laid are the irregularity of shape, size, and consistence of the cell-body, its frequent vacuolation, the variety of shape, size, and location of the nucleus in the cell-body, the multiplicity of nuclei in some of the cells, and the evidences of both direct and indirect (karyokinetic) cell-division, often very anomalous in type.



The manner in which these peculiarities of the cells were made apparent is also of interest, as evidences of karyokinesis often disappear with great rapidity. The fluids obtained by tapping were taken at once to the laboratory and their sediment was immediately collected with the aid of the centrifugal machine. This was then spread in a thin layer on cover-glasses, was allowed to dry, and was immersed in alcohol and ether, equal parts, for an hour, after which its cells could be readily stained by a weak hæmatoxylin solution.

It is also of interest in this case that a secondary growth made its appearance at the site of one of the abdominal punctures, the result, Rieder is inclined to believe, of an engraftment on the fresh surface of the wound of some of the tumor-cells so abundant in the fluid, and which examination showed to be in active karyokinesis.

In conclusion reference is made to a communication by Neelsen to the *Dresdener Gesellschaft für Naturwissenschaft* in which the diagnosis of carcinoma of the bladder was based upon the presence in the urine of cells undergoing irregular karyokinesis.

#### CASTS WITHOUT ALBUMIN.

The occurrence of casts in the urine without albuminuria has been recognized as frequent in jaundice and as occasional in some other conditions in which degeneration of the epithelium of the renal tubules is met with, but at best this has been regarded as exceptional. It is, therefore, matter of some surprise to find KOSSLER (*Berliner klinische Wochenschrift*, 1895, Nos. 14 and 15) describing the occurrence of casts without albumin in 29 cases of diseases of various types. They were separated from the urine by means of the centrifugal machine.

The diseases in which this result was obtained were for the most part members of the infectious group, as phthisis, scarlatina, typhoid fever, pneumonia, and other febrile disorders, though it was also observed in cardiac disease and in phosphorus-poisoning. The casts found were of almost all varieties—hyaline, granular, fatty, epithelial, blood, leucocyte, and occasionally waxy—and they were often present in considerable numbers.

Kossler is therefore loath to accord much diagnostic importance to the presence of casts alone in cases of suspected nephritis, especially as in several of his cases in which he was able to make a subsequent examination of the kidneys no structural evidence of nephritis was discoverable.

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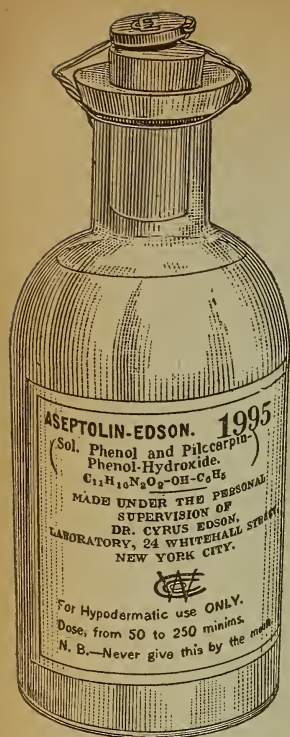
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CONGENITAL EROSION AND SPLIT OF THE CERVIX UTERI.<sup>1</sup>

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I PRESENT this paper to the College of Physicians in order to direct attention to a condition of the cervix uteri in virgin and sterile women which I think is not by any means generally recognized, and to obtain from the members of the College some information from their own experience; for since my attention has been directed to this subject I have talked of it with several physicians in general practice, and a few of them had seen cases which puzzled them and which they thought belonged to the class of cases which I am about to describe—under the name Congenital Erosion and Split of the Cervix Uteri.

A few text-books on gynæcology refer to this congenital condition. The only papers upon the subject of which I have any knowledge are by Leopold in 1872 and by Fischel in 1880.

Fischel's paper is called a contribution to the morphology of the cervix uteri. As the explanation of the cases which have occurred in my own experience is furnished by this paper, I have added a short abstract of it which Dr. Lawrence S. Smith has very kindly made for me.

A CONTRIBUTION TO THE MORPHOLOGY OF THE CERVIX UTERI.

During the course of a series of investigations on the cervixes of infants who had been stillborn or who had died soon after birth the author's attention was called to a condition which, so far as he knew, had never been described by any anatomist or gynæcologist that had undertaken the study of this part of the anatomy, namely, the occurrence of erosions. A short time before he had discovered by accident in the *Transactions of the Gesellschaft für Geburtshülfe* in Leipzig, July 15, 1872, a communication by Leopold stating that he had seen such an erosion of the cervix, and declaring it to be an anomaly in the newborn child heretofore unrecognized. In the debate

<sup>1</sup> Read before the College of Physicians of Philadelphia, February 5, 1896.  
VOL. 111, NO. 5.—MAY, 1896.



that followed Ahlfeld stated that circulatory congestion in the uterus and, apparently also, erosions of the mucous membrane were a frequent occurrence in asphyxiated infants. (*Archiv f. Gynäkol.* B. v. S. 162.)

From this short notice Fischel judges that neither Leopold nor Ahlfeld had ever subjected these erosions to a microscopic examination. He therefore publishes the investigations he made and also the conclusions he reached as a result of them.

"On twenty-eight cervixes examined he found ten erosions of varying character and size; of these ten cervixes, four were from fetuses stillborn at term, two from infants a few days old, one from an infant fourteen days old, and three from infants three, four, and five weeks old, respectively. From the eighteen cases in which no erosion of any kind was found, five were still-born at term, one a few days old, one nine weeks, one thirteen weeks, two eighteen months, and one two and one-half years old. The others came from fetuses in the sixth, seventh, eighth, and ninth month of intrauterine life."

From these cases he found that the assertion of Ahlfeld (see above) had no value as far as cause and effect between asphyxia and erosion were concerned, since, of the five children born asphyxiated, none showed any erosion, while some did that died at varying periods after birth.

"The appearance which the erosion on the infantile cervix presents varies both in extent and in the form of the change. In most cases the external os forms a rather narrow transverse opening surrounded by a reddened, velvety area 3-4 mm. wide. In other cases the erosion extends onto the lateral surfaces of the cervix higher up than on the anterior and posterior aspects. In other cases still, and these bore the nearest resemblance to erosions in the adult, the change was limited to the under surfaces of the lips of the cervix as far as they came in contact with the posterior vaginal wall."

He points out that with the naked eye two forms of erosion may be distinguished: one with a satiny appearance, another of a rougher, more granular character, recognized as papillary. Microscopically, the papillæ, instead of being protected by an even covering of squamous epithelium, stand out separately in a more or less irregular arrangement. Covering the uneven surface thus formed is a single layer of cylindrical epithelial cells. On the ends of the papillæ the cylindrical form is replaced by a flatter, more cubical one, but everywhere the layer is single. There is no transition-form between squamous and cylindrical epithelium; but the hue of demarcation is always sharply defined, so that, for example, one side of a papilla may be lined with stratified squamous, the other with simple cylindrical epithelium. In many places compound glands, acinous in character, open into the depressions between the papillæ, and into these glands the simple columnar epithelium dips down. The mucosa itself is composed, as usual, of a connective tissue rich in nuclei.

To sum up, he concludes "that in almost 36 per cent. of newborn infants the vaginal surface of the cervix from the external os toward the vaginal fornices is covered more or less extensively with a mucous membrane, which, from the form of its epithelium, from its less papillary character, and from its possession of mucous glands and crypts, must be regarded as a direct continuation of the cervical mucous membrane.

"The dividing-line between the epithelium of the vagina and that of the uterus does not lie, as we are led to believe by all previous investigators, even the latest—Klotz, at the outermost end of the cervical canal, but may be situated even on the external vaginal surface of the cervix more or less high toward the vaginal fornices. For this condition I adopt the name congenital histological ectropium.

"This dividing-line between the two forms of epithelium lay, in the greater number of cases, within the cervical canal 2-3 mm. above the external os, and coincides with the external os in only a minority of cases."

The degree of development of glands in the cervical canal and on the outer surface of the cervix varies greatly in different individuals, as does also that of the palmar plicatæ within the cervix. In some these glands were

exceedingly well developed, but where the surface was covered with squamous epithelium he found no trace of glands of any kind.

He accounts for the formation of this ectropium by the theory that, after the formation of the uterus and vagina by the union of the lower segments of the ducts of Müller, which are lined with a simple columnar epithelium, a change begins at either end in the mucous membrane. In the uterus this change consists in a development of a glandular system, while in the vagina, beginning at the urogenital sinus, the columnar epithelium gradually changes into the squamous variety. At the termination of intrauterine life this change should have reached the external os, but owing to the varying rapidity with which it progresses in different individuals the point which it reaches varies, being sometimes higher, sometimes lower than normal. If the squamous epithelium reaches the cervix before any glandular development has taken place in its mucosa, no glandular openings are found on its surface, nor are any glandular formations found beneath it. If, however, the columnar epithelium has already begun to send down processes into the mucosa before the squamous metamorphosis overtakes it, these glandular structures persist and may develop further. This theory accounts for the histological ectropium, and also the presence of glands in the vaginal wall that Preuschen has described.

In regard to the connection between the histological ectropium and erosions and other pathological conditions he says: "It must be acknowledged as possible that erosions occur in adults when the individual has received a predisposition to it during the period of her development. It is, furthermore, to be conceded that this congenital histological ectropium of the cervix may be covered over by squamous epithelium, but still retain under this covering the glands and other attributes of a cervical mucous membrane. If now, through some inflammatory process, the tissues become congested and infiltrated with round-cells, the acquired superficial (squamous) epithelium will be shed, and the original columnar epithelium be brought to light, presenting the complete picture of a true oedematous or papillary erosion, a condition that differs from the normal cervical mucous membrane only in its greater succulence and in the richness in cellular elements.<sup>1</sup>

"However, I will admit that, as I have stated in my paper on erosions, the formation of the erosion may occur on a spot normally covered with squamous epithelium. But when I consider that even in adults the erosion never passes beyond the limits which we have recognized as originally those of the cervical mucous membrane (the highest boundary in my cases lay approximately midway between the external os and the fornix vaginae), it becomes more and more evident to me that of women whose cervixes are intact, those only will have erosions who are predisposed to them by this congenital condition which I have described."

He believes that the persistent and almost incurable forms of catarrh, for which Schröder has advised excision of the mucous membrane, are the result of a predisposition seated in the congenital hypertrophy of the "arbor vitae" and its glands.

After a description of the normal cervix with its transversely oval os and its anterior and posterior lips united by the lateral commissures, he alludes to the injuries usually inflicted on it in labor and to the changes that these injuries produce in its form and appearance until the laceration ectropium described by Emmet is formed.

"I am now able," he says, "to show a photographic representation of the cervix of a newborn infant which presents an inferior degree of this condition. The separation of the lips does not extend all the way to the vaginal junction, but concerns only the lower two-fifths of the lateral corners. Nevertheless, the two lips deprived of their commissures gape open, the crest of one being 9 mm. from that of the other, exposing the cervical surface of both lips for a distance of 5-6 mm. This case shows that a peripheral notching of the cervix is not always a sign of a previous labor,

<sup>1</sup> Virchow's Archiv, B. 70, S. 116. "Ueber Cystenbildung in der Vagina."

but may represent a condition of the cervix in pregnant women whom we were forced to consider primiparæ not only through their own statements, but also from the condition of the external genitalia. This case is of great forensic importance in that the proof of a former labor can no longer be claimed for such a condition of the cervix."—*Archiv f. Gynäkologie*, 1880, Bd. xvi. S. 192.

It will be observed that there are two distinct conditions described by Fischel—a congenital erosion and a congenital split of the cervix, and the former is much the more frequent lesion, occurring to a greater or less degree in 36 per cent. of the infantile cervixes which he examined.

I have had no opportunity of studying the cervixes of infants, but I have met one undoubted case of congenital split of the cervix in a virgin, and three cases of disease of the cervix in young women, which I think may be explained by the presence of the congenital erosion described by Fischel.

I have described the first case in detail, because in it the cervix was amputated and submitted to microscopic examination.

CASE I.—N. S., white, aged twenty-five years, single. Menses began at fourteen years, occurred every twenty-eight days, and were of four days' duration. She had suffered for five years with profuse leucorrhœa, backache, and slight left ovarian pain. She was a well-developed, strong woman. Careful questioning and observation rendered it most probable that she was virtuous.

She had never had local gynæcological treatment.

The ostium vaginæ was virginal. On the posterior margin there was a crescentic hymen, which was not, however, sufficient to prevent coitus. The vagina was small and virginal. The vaginal cervix was mushroom-shaped (see Plate, Fig. 1). The face of the cervix was flat, or very slightly evenly convex. The face of the cervix projected (like the top of a mushroom) on all sides beyond the upper portion which corresponded to the stalk of the mushroom. The face (see Plate, Fig. 2) of the cervix was round and about one and a half inches in diameter. In the figure



Microscopic section of vaginal cervix in Case I.

it is oval on account of the traction from the tenaculum. The external os was transverse—one-third of an inch broad. Upon the face of the cervix were several scattered patches of erosion.

The cervix was amputated and microscopical examination was made by Dr. Lawrence S. Smith.



The cervix was covered with squamous epithelium, except on the small patches of erosion, where cylindrical epithelium was present. Racemose glands (like the normal glands of the cervical canal) opened all over the face of the vaginal cervix, in front, behind, and to the sides of the external os. They were found as far as one half to three-quarters of an inch from the external os. These glands opened on the vaginal aspect of the cervix, where it was covered with squamous epithelium, and this epithelium extended to the ducts of the glands, which were lined with cylindrical epithelium. The vaginal cervix was, in fact, a glandular structure.

It will be remembered that normally no glands whatever open on the vaginal aspect of the cervix uteri.

The erosions which are usually seen in practice are those which accompany an inflammation of the mucous membrane of the body or neck of the uterus, and which are caused by the irritating discharge, and those erosions, by far the most frequent and pronounced, which are due to laceration of the cervix with eversion of the lips. In the cases of the first class there is no alteration in the general shape of the cervix. There are no glands discharging upon the vaginal aspect of the cervix, unless there be present a prolapse of the cervical mucous membrane.

In the cases of the second class, those due to laceration, the shape of the cervix is altered and there is a marked erosion, which is caused by the exposure of the normal mucous membrane of the cervical canal, and perhaps by some proliferation from irritation of the cellular and glandular elements of this mucous membrane.

The differences between the condition found in the case which I have described and that present in a case of bilateral laceration with ectropion of the cervix uteri may be stated as follows:

In the laceration there is a history of pregnancy. The face of the cervix is oval, the antero-posterior axis being the longer. The angles of laceration are marked either by a depression on each side of the apparent external os or by a palpable plug of cicatricial tissue. The ectropion is antero-posterior; there is no lateral ectropion.

In the condition in Case I. there had been no pregnancy. The face of the cervix was round, plane, or very slightly uniformly convex. There was no indication of any angle of laceration, macroscopically or microscopically.

The cervix is mushroom shaped. The ectropion is lateral as well as antero posterior.

It seems probable that the condition which I have described is distinct and congenital, and is due to the development upon the vaginal aspect of the cervix of those structures which are normally confined to the cervical canal.

It will be remembered that Fischel found such a condition in 36 per

cent. of the infants examined by him; but most of these erosions were slight in extent and would certainly have given no trouble if they had persisted to adult years. It is probable that many of the slight erosions not caused by cervical catarrh, which are found in young girls, may be explained by Fischel's theory. Such erosions are common in cases of congenital antelexion, and it is in such cases of imperfect development of the uterus that one should expect to find imperfection in the development of the external os.

When, however, this congenital erosion is present and persists over the greater part of the vaginal cervix, as in one of Fischel's cases, the condition which I have described may be produced, and symptoms will be caused by it which are similar to those following bilateral laceration of the cervix with ectropion.

The shape of the cervix in the case which I have reported is peculiar. If the condition is, as I have attempted to show, caused by the congenital growth of the mucous membrane of the cervical canal over the vaginal aspect of the cervix, or, in other words, by a defect in the development of the external os uteri, one would expect to find a change in the normal growth and hence in the adult shape of the cervix.

I have observed a similar condition of the cervix uteri in two other cases—one a married woman of thirty years who had never conceived, and the other a probable virgin of twenty-one years. As in these cases the cervix was not amputated, I was unable to make a microscopical examination to prove its glandular character; the macroscopical features, however, were similar to those of the case already described.

The proper treatment for such cases is amputation of the cervix. Complete relief from all symptoms followed this operation in the case here reported. In one of the other cases I performed an operation similar to trachelorrhaphy, cutting out the lateral portions of the cervix, and attempted in this way to restore the normal shape of the cervix; but the woman derived little or no benefit from it.

CASE II.—C. W., aged seventeen years, a modest school-girl of respectable parents. Careful questioning of her mother, father, and family physician rendered it extremely probable that the girl was virtuous. She had never had any local treatment of the uterus. She came to the University Hospital on account of painful and frequent urination. She was etherized and an endoscopic examination of the bladder was made. The appearance of the interior of the bladder suggested tubercular cystitis, though the disease subsequently yielded to local treatment.

While the girl was under ether an examination was made of the vagina and uterus. The ostium vaginae was very small, and there was a well formed annular hymen, which with difficulty admitted the little finger. Introduction of the index-finger ruptured the hymen. There was a bilateral split of the cervix which was most marked on the left side. The depth of the split on the left side was three-eighths of an inch. There was no ectropion. There was an erosion surrounding the

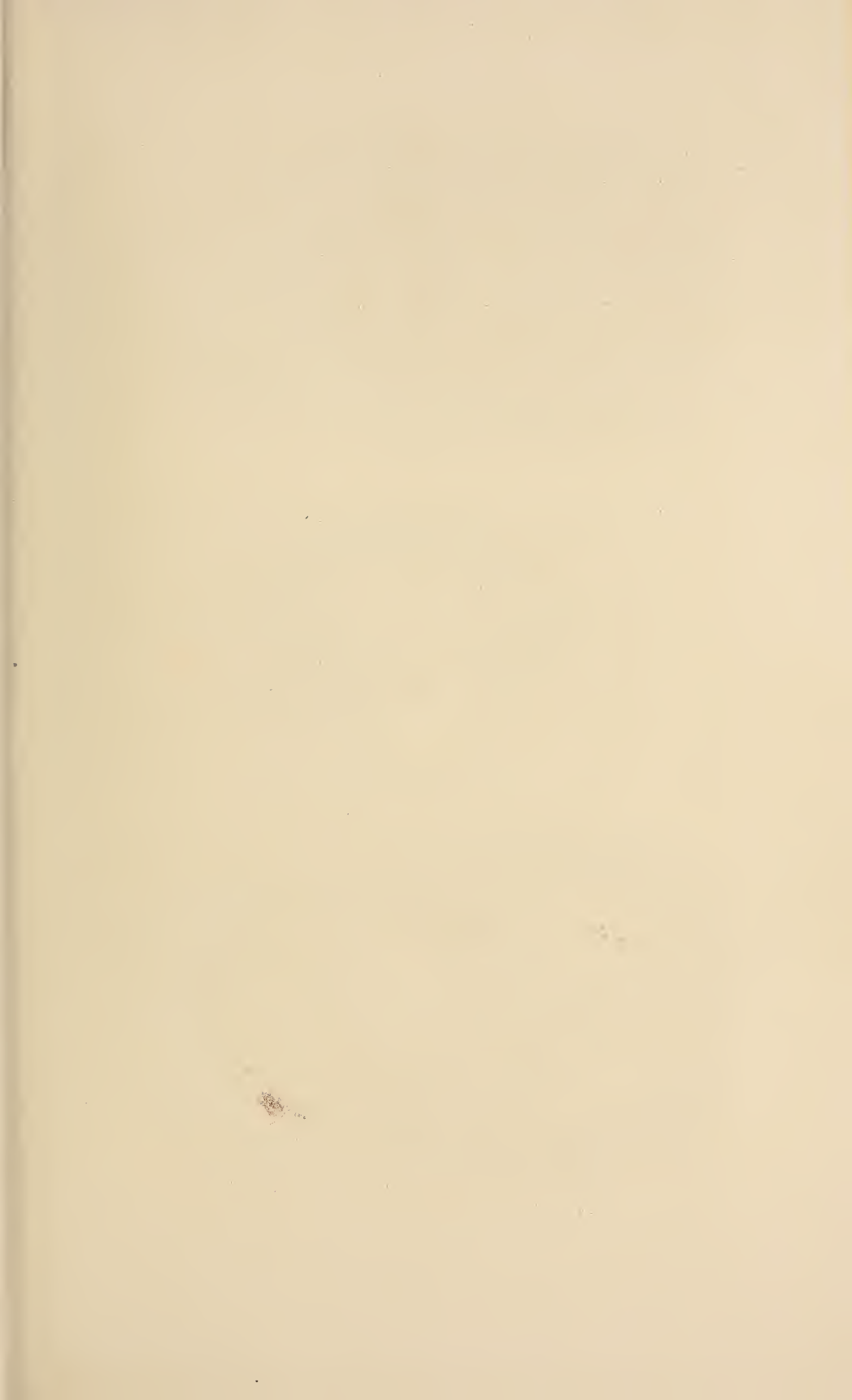
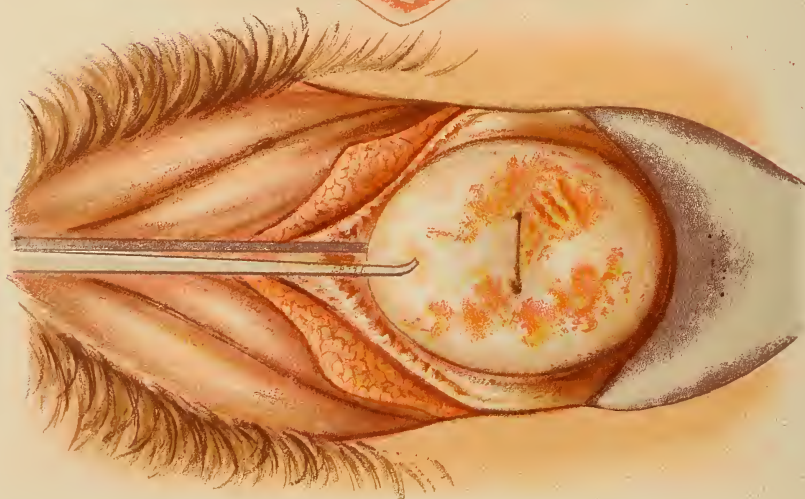




Fig. 1.



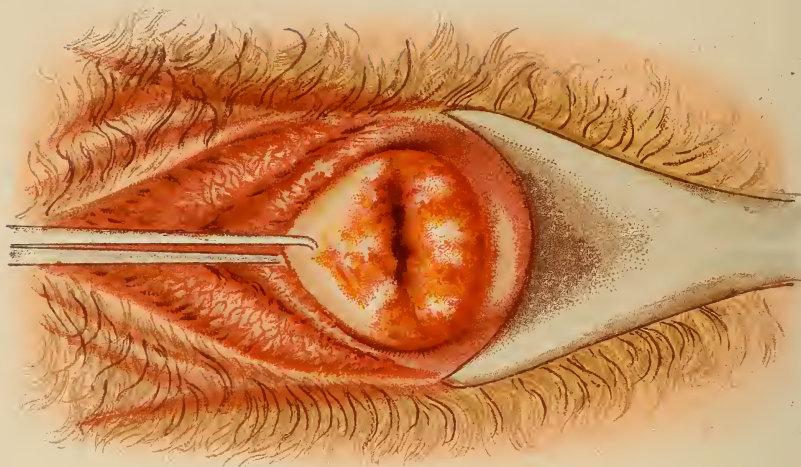
Congenital erosion, Case I.

Fig. 2.



Congenital erosion, Case I.

Fig. 3.



Congenital split of the cervix, Case II.

os. The uterus was in the second degree of retroversion. The integrity of the hymen was not regarded, because it was thought that the retroversion would require correction. There was no leucorrhœa.

The appearance of the vaginal cervix is well shown in Fig. 3 of the Plate, which was made from life. The macroscopical appearance of the cervix is in all respects similar to that seen after laceration from abortion, miscarriage, or labor; though the case reported was an undoubted case of congenital split of the cervix.

As pointed out by Fischel, the importance of such cases is very great from a medico legal point of view.

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### A STUDY OF THREE CASES OF TUMOR OF THE BRAIN IN WHICH OPERATION WAS PERFORMED—ONE RECOVERY, TWO DEATHS.

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NOTWITHSTANDING the brilliant results obtained in single cases of tumor of the brain operated upon with success, the general results of surgical interference in this class of cases, it must be admitted, are not as encouraging as we would desire them to be, especially when we compare them with the splendid showing of the operative treatment of certain pyogenic diseases of the brain.<sup>1</sup>

From *Chipault's* very complete table in his recent admirable work on the *Surgery of the Nervous System*, I find that 63 of 123 cases of brain-tumor operated upon died from the effects of the operation (51 per cent.). Forty-nine cases in which a tumor was removed recovered from the operation—it is impossible, however, to state exactly how many of these cases were cured of their disease, or even greatly benefited by the operation, which is the salient point of the whole subject.

The difficulties which beset the successful surgical treatment of tumors of the brain are of threefold character :

<sup>1</sup> See Macewen : Pyogenic Infectious Diseases of the Brain and Spinal Cord, 1893.

1. The difficulties of diagnosis, both of the presence of a new growth and of its exact position in the cranial cavity.
2. The inaccessibility of the new growth.
3. The excessive size of the latter.

Some of these difficulties are insurmountable, notably those offered by the inaccessible location of a tumor, although the limits of "accessibility" vary with the boldness and genius of the surgeon; others again, especially the difficulties of a diagnosis, we neurologists may hope to surmount more and more, as our experience broadens and our knowledge of cerebral anatomy, physiology, and morbid manifestations grows. This purpose, I believe, is served to some extent by a careful study of the clinical history and pathological bearings of every case of brain-tumor we meet with, and especially of every case operated upon, whether with or without success. In this spirit the following study of three cases of brain-tumor I have had operated upon during the last two years is offered for your consideration:

CASE I. *Glio-sarcoma, the size of an almond, developing two years and ten months after the successful removal of a cystic tumor of the left motor area; successful localization and excision; recovery.*—This is the case of cystic tumor of the brain presented to the Neurological Society of New York in January, 1893, and reported in *THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES* for June, 1893, p. 620. The history of the case as published at the time is briefly recapitulated:

K. H., born in 1866, has been always well prior to her present trouble; no specific nor hereditary taint, no history of injury to the head nor of previous convulsions. In October, 1891, while talking quietly with her husband, the patient suddenly felt the thumb and forefinger of her right hand twitch; the convulsive twitching spread rapidly up the arm to the shoulder and face, leading finally, within a few moments, to a general seizure with loss of consciousness, cyanosis, frothing at the mouth, and general clonic-tonic convulsions. A second similar spell occurred seven weeks later, a third two weeks thereafter, early in December. On December 22d the patient had three seizures, one of them with involuntary micturition. On December 23d she was seen for the first time at the Mt. Sinai Hospital Dispensary. Suspicion of a localized cerebral lesion was immediately aroused; but as she showed absolutely no other symptoms she was put upon bromides and kept under observation. She had spells on January 5th and 13th, three on January 15th, and one on January 19th, after which she had no more general convulsions at all; convulsive twitchings confined to the right hand and forearm, and always beginning in the thumb and index-finger, occurred, however, almost daily.

In February a marked paresis of the right hand developed, which increased slowly in the course of the next few weeks. There never was any headache, vertigo, nausea, drowsiness, or impairment of the memory; there was no tender cranial point. Dr. Koller examined the patient's eyes a number of times and never could discover any sign of beginning papillitis. The deep reflexes were lively on both sides, especially so in the right arm. Localized convulsive twitchings occurred almost daily; one seizure occurred at the dispensary and was witnessed by me.



The diagnosis of an organic lesion, probably a tumor, in the left anterior central convolution at the juncture of the lower and middle thirds, the motor centre for the thumb and forefinger, was made. Although there were but two symptoms present to base a diagnosis upon, they were of great significance; the symptoms of cortical irritation, with subsequent loss of power in the very group of muscles affected by the convulsive twitchings, left no doubt as to the presence of an organic lesion of a progressive and destructive character. The utter failure of thorough treatment with mercury and iodides (300 grains a day) excluded syphilis, nor was there anything to favor the diagnosis of an abscess. In spite of the absence of all general cerebral symptoms the diagnosis of tumor was, therefore, made by exclusion.

The patient was operated upon by Dr. Gerster at the Mt. Sinai Hospital on June 25, 1892. A subcortical cystic tumor was found at the point designated above and evacuated, an ounce of straw-colored serous fluid escaping. Dr. Gerster introduced his little finger into the cyst about one and a half inches and found its walls perfectly smooth. A small layer of gray matter was removed from the exposed centre. The removal of the cyst-wall was considered inadvisable for surgical reasons. The dura was not adherent to the brain at any point.

The patient made a good recovery, gradually regaining the use of her right hand and arm, which were almost entirely paralyzed after the operation. Four weeks later slight convulsive twitchings occurred in the right hand, arm, and face. On August 7th the scalp-wound was reopened, adhesions between the flap of skin and the dura were separated, and a flexible gold plate was inserted between the two to prevent any recurrence of adhesions and to serve as a protection to the brain, the plate projecting slightly beneath the ledges of the opening in the skull.

By the end of October the patient was able to write, sew, and do light housework; before the operation she had not been able to use her hand at all any more, so there can be no doubt that she was benefited by the operation, especially when we bear in mind that the paralysis was steadily progressive at the time.

The most noticeable feature in the case was the *absolute absence* of general cerebral symptoms—this was readily accounted for at the operation by the absence of any increase of the intracranial pressure.

In discussing the pathology of the evacuated cyst the conclusion was arrived at that a *glioma or sarco-glioma* was, in all probability, at the bottom of the trouble; the fear of a further growth of the neoplasm presumably left in the walls of the cyst was expressed and the desirability of removing the entire cyst-wall emphasized (p. 624). The subsequent history of this case, which has been under my care ever since, being seen every two to four weeks during this time, is as follows:

December 22, 1892, six months after operation, general epileptic seizure beginning in the right arm. During the next four months twitchings, confined to the right hand or hand and face, occurred at irregular intervals, generally not oftener than every two or three weeks. After each seizure the hand is weak for a few hours. The patient was kept during this time on 2 drachms to 3 drachms of bromide of potash a day. The deep reflexes on the right side of the body are greatly increased; tapping the tibia, for instance, elicits a reflex contraction in the adductors of the thigh.

April 17, 1893, I find noted: For the last four weeks no twitchings have occurred at all; the patient feels very well. Dynamometer-test: R. 30—L. 45.

December 19. The patient has had twitchings every three or four weeks of late. To-day a general seizure occurred, the second one since the operation; the spell began locally like all the previous ones.

January 20, 1894. Third general seizure.

21st, 22d, 23d, and 24th. Local seizures, sometimes two or three times a day. No headache, vertigo, nausea, no sign of papillitis (Dr. Koller). Dynamometer-test: R. 30—L. 45.

February 26th. Fourth general seizure.

During the next twelve months the patient was examined at regular intervals, but no objective change in her condition was ever found. The twitchings grew more and more frequent and finally occurred almost every day. In all she has had three more general convulsions during this time.

March 1, 1895. *For the last ten days the patient has been suffering from severe headache*—the first headache, she declares, she has ever had in her life; the headache is general in character, not more severe on either side. There is no nausea, vomiting, or vertigo. Bowels have been regular; the urine is free from albumin. The strength of the right hand has diminished perceptibly, the dynamometer showing only 20 as to 32 found two months before. There is no disturbance of sensation beyond a feeling of numbness, which occasionally precedes or follows a localized seizure. Speech is perfectly free. The deep reflexes are as lively as ever on the right side. Dr. Koller, who had examined the patient every few months, finds *her disks for the first time slightly but distinctly cloudy and swollen*.

15th. The same ophthalmoscopic condition reported by Dr. Koller; there is now also some dilatation of the veins. The headache has been controlled by gr. x to gr. xv phenacetin a day. Almost every night twitchings in the right hand. The patient cannot flex the small finger of the right hand any more; no other absolute paralysis.

The diagnosis was made of a recurrence of the growth, probably a glioma, at the old seat of the lesion or of a refilling of the evacuated cyst, the diagnosis being based upon the development of headache, which had never been present before, upon the beginning papillitis, and upon the increasing weakness in the right hand. Early operative interference was strongly urged, and on April 8th, two years and ten months after the first operation, the patient was operated upon by Dr. Gerster at the German Hospital. The old flap was raised and immediately beneath it the gold plate was found as bright and untarnished as three years ago. A perfectly smooth membrane, resembling a synovial membrane, had formed on the inner surface of the scalp from the contact with the gold plate. The latter was raised and removed without the slightest difficulty; the dura beneath was of good color, and bulged but little. An aspirating-needle was introduced in four or five directions without any result. The dura was then opened by a crucial incision and was found to be adherent to the brain-substance beneath. Inspection of the exposed brain revealed the presence of a small maroon-colored mass toward the upper margin of the opening in the skull; the latter was enlarged with the aid of the rongeur, exposing the limits of the new growth on all sides. In excising the neoplasm it was found to extend quite a distance vertically into the

substance of the brain, being shaped like a cone, with its base on the surface and its apex buried in the substance of the brain. The conical mass, which was hardly larger than a good-sized almond, was removed in two or three pieces from above down and a ring of the surrounding brain-tissue about half an inch wide (on each side) excised, as it was apparent that we had to deal with an infiltrating neoplasm. The adherent piece of dura was also carefully excised. The hemorrhage, which was not profuse, was readily controlled by compression with gauze. The dura and scalp-wound were closed by sutures and the wound dressed. The gold plate was not reinserted on account of a likelihood of a recurrence of the tumor at a future date.

FIG. 1.



Showing the opening in the skull in Case I.

*April 9th.* Patient has stood the operation well. The right hand and arm are paralyzed; the patient complains of pain in the paralyzed limb. Headache and some difficulty in speech. No temperature.

*10th.* Some headache. Condition unchanged.

*12th.* The patient is able to flex and raise the hand in the wrist-joint somewhat.

*13th.* She is able to move the third and fourth fingers slightly. The sensibility to the lightest touch is unimpaired in the hand and forearm. The sense of position of the fingers and arm very uncertain.

*15th.* Dressing changed. Three severe general seizures occurred after the change of dressings, all of them beginning in the paralyzed arm.

*20th.* The power in the paralyzed muscles is slowly returning; with the exception of the thumb and index-finger the patient can move all of her fingers, with great effort only, to be sure.

*May 9th.* There is marked improvement in the condition of the arm; the latter can be raised above the head, the patient can shake hands, and has some, though very slight, use of all her joints except those of the thumb and index-finger, which remain paralyzed. The index-finger can be extended and flexed in the metacarpo-phalangeal joint, but not in the two interphalangeal joints. The general condition of the patient is good;



there has been no headache nor any further sign of any convulsive seizure thus far.<sup>1</sup>

The new growth and the surrounding brain-tissue were hardened in alcohol, imbedded in celloidin, and subjected to a careful microscopic examination, which revealed very instructive and interesting morbid conditions. The excised cone was cut in transverse sections and was found to consist in the main of the wall of the old cyst; sections from its apex simply show the very thick cyst-wall consisting of striated fibrous tissue with occasional spindle-shaped cellular elements, the microscopic picture greatly resembling that of the dura mater. A recent hemorrhage in the

FIG. 2.



Photomicrograph  $\times 25$ , showing the sarcoma originating from the old cyst-wall.

cyst can be readily demonstrated. As the sections approach the base of the cone—*i. e.*, the surface of the brain—a point is reached at which a sarcomatous growth consisting mainly of spindle-cells can be seen originating from a point of the old cyst-wall (Fig. 2); the remaining cyst-wall

<sup>1</sup> A few words concerning the subsequent history of K. H. (Case I.) may be of interest. The patient has been in perfect general health ever since the last operation (one year ago), and shows thus far no symptoms of any further growth of the neoplasm. Since the convulsions which were brought on by the change of dressing after the operation, she has not had the slightest twitching nor sign of any epileptic seizure of any kind, in which respect she is much better off than after the first operation. I attribute the absence of the twitchings to the thorough excision of the affected area, and perhaps, too, to the liberal opening in her skull. The patient has recovered the use of her paralyzed arm to a considerable extent, the thumb and index-finger alone remaining powerless. Cutaneous sensibility is perfect, but there is a marked insufficiency of the muscular sense in the right hand; only comparatively extensive movements in the finger and wrist-joints are appreciated. This dissociated disturbance of the muscular sense in a distinctly cortical lesion affecting the corresponding motor area is of interest. —L. S., March, 1896.

at this level shows recent hemorrhages and two or three areas of small-cell infiltration; otherwise no indication of any active morbid process. In many sections the new growth, not larger than a lentil, can be seen attached to the old cyst-wall with the naked eye. A closer examination of the growth shows it to consist mainly of spindle-shaped sarcoma-elements, partly of glioma-cells and partly of angio-sarcomatous formations.

The microscopic examination of the surrounding brain-tissue was a revelation: at the point where the new growth attached to the cyst-wall was in contact with the brain-tissue, the latter is seen to consist for the extent of a few millimetres of a glio-angio-fibro- and melano-sarcoma, the character of the neoplasm varying at different points. The neoplasm is nowhere sharply separated from the brain-tissue proper; the latter is infiltrated by the elements of the new growth; in some sections two or three islets of spindle-cells, containing not more than a dozen cells apiece, can be seen in the midst of healthy brain-substance, indicating a beginning metastasis.

The malignancy of the entire process is very evident and the recurrence of the growth only a question of time; taking its malignant character and its small extent into consideration, we may conclude, I believe, that its development from the old cyst-wall was of recent date, perhaps not older than a few months, which would agree also with the clinical history.

The conclusions I should like to draw from this case may be formulated as follows:

1. A new growth may be present in the brain without causing any general cerebral symptoms whatsoever. In order to make an early diagnosis of a new growth it is well, therefore, to be guided by the symptoms present rather than by the absence of other customary symptoms.

2. A cystic tumor of the brain not of parasitic origin is not so innocent in character as many would believe.

3. The simple evacuation of such a cyst when found is not sufficient; if it is surgically possible, the wall and the surrounding brain-tissue should be excised in order to prevent a future growth of the malignant elements left in the wall of the cyst.

4. If the immediate excision is not possible, *it would be advisable to open the wound a few months later and attempt to excise the collapsed cyst-wall, which is compressed into a small space by the general cerebral pressure, in the same way in which an abscess-cavity is quickly obliterated after evacuation.* In our case I do not doubt that the secondary excision could have been easily done at any time during the three years which elapsed after the first operation.

CASE II. *Glio-sarcoma of the right cerebellar hemisphere; successful localization; operation; death; autopsy.*—H. S., aged thirty-three years,

born in Russia, was first seen on July 31st, at the Mt. Sinai Hospital Dispensary, being referred to my department by the kindness of Dr. Koller, whom he consulted on account of failing vision.

*Previous history.* The patient has taken liquor moderately; never suffered any injury to his head. Acquired a chancre in 1884; does not know of any secondary manifestations. Has been married six years and has three healthy children.

His present trouble began two years ago with intense headache, vertigo, and occasional vomiting. The giddiness was at times so severe that he would fall to the ground, without losing consciousness, however. About nine or ten months ago he noticed that his eyesight was failing him, and that he was growing deaf in his right ear. His gait was at times so unsteady that he was suspected of being intoxicated. Dr. Koller, whom he consulted, found well-marked choked disks in both eyes and amblyopia of the right eye, so that the patient could distinguish fingers only in the right lower quadrant of the visual field. The vision in the left eye was diminished.

Present condition, July 31st: Tall, well-developed man, of good intelligence. Examination of the head revealed no area especially tender to percussion; the left frontal region was somewhat more sensitive to the blows of the percussion-hammer than other parts of the head. The pupils are dilated and respond sluggishly to light, the right pupil more so than the left. The movements of the right eye are not so perfect as those of the left; the eyeball can be moved in all directions, but extreme positions are not attained, which Dr. Koller ascribes to the loss of vision with its loss of impulse for energetic effort.

The muscles of the face show no paresis whatsoever, the eyes are closed tightly, the eyebrows raised, the cheeks puffed up, the lips puckered, etc., without any noticeable difference between the two sides. The tongue is protruded straight and moved freely. Sensation is not disturbed in the face; the sense of taste is perfectly normal. The right ear is absolutely deaf to air- and bone-conduction. There is no impairment of hearing in the left ear. Pressure of the right hand 76, left 55. There is no muscular weakness nor disturbance of sensation in any part of the body; the sense of position is reliable in all the limbs. The knee-joint is equally lively on both sides; the deep reflexes are easily elicited in both arms. Plantar and cremasteric reflex prompt, abdominal reflex less so. No Romberg. The patient's gait varies: at times he walks without any indication of unsteadiness; at other times there is very marked staggering, the gait resembling that of an intoxicated man, with a tendency to fall to the right.

*August 2d.* The examination was completed by careful electrical tests of the seventh, eighth, and twelfth cerebral nerves.

Examination of the facial nerves shows *partial reaction of degeneration on the right side.*

|                                             | Right facial nerve. | Left facial nerve. |
|---------------------------------------------|---------------------|--------------------|
| Faradic current (coils separated) . . . . . | 120 mm.             | 120 mm.            |
| Galvanic current . . . . .                  | 2.5 CaCC.           | 2.5 CaCC.          |
| Muscles of lower lip:                       |                     |                    |
| Faradic current (coils separated) . . . . . | 80 mm.              | 100 mm.            |
| Galvanic current . . . . .                  | 1.5 ma. AnCC.       | 3 ma. CaCC.        |
|                                             | 2.5 ma. CaCC.       |                    |

Contractions sluggish.



We have, therefore, increased galvanic excitability, ACC > CCC, and sluggish contractions in the muscles; no change of excitability in the nerve-trunk; partial reaction of degeneration.

Auditory nerves: In the right (deaf) ear no response at all is obtainable; in the left ear hyperæsthesia (hyper-excitability) with reversal of the normal formula is found:

AnC Sd (sound) at 0.5 ma.

AnC Sd > CaC Sd.

AnC Sd (0.5 ma.) > AnO Sd (1 ma.).

When the positive pole is applied and the current (0.5 ma.) is closed the patient says he hears loud ringing—when the negative pole is applied no sound at all is heard with the same strength of current; when 1 ma. is used loud ringing is heard upon AnC and whistling upon CaC and AnO, though less loud. With 2 ma. the ringing after AnC continues as long as the current is turned on.

N. hypoglossus: The tongue shows no change in the electrical reactions.

*Diagnosis.* The choked disks, the headache, vertigo, and nausea indicated the presence of a tumor of the brain; the occasional staggering, the spells of intense vertigo, the deafness in the right ear, and the partial R. D. on the right side of the face established the diagnosis of a tumor of the right hemisphere of the cerebellum, compressing the seventh and eighth nerves prior to or at their common entrance at the internal auditory meatus. The exclusive involvement of the seventh and eighth nerves at the base of the brain justified the conclusion that the new growth pressed directly and not indirectly upon them, and that it was situated, therefore, in the ventro-cephalic part of the right cerebellar lobe in the neighborhood of the internal auditory meatus.

As to the character of the tumor, the history of chancre given by the patient had to be taken into consideration, and the possibility of the presence of a gumma could not be excluded. The marked variations in the intensity of the patient's symptoms, of the headache, vertigo, and staggering indicated, however, rather the presence of a vascular growth, a glioma or a sarcoma, and the subsequent complete failure of specific treatment to relieve the condition in any way confirmed this view.

*Subsequent course.* The patient was put from the very first upon a course of mercurial inunction, 4 grammes a day, and iodide of potash was pushed at the same time rapidly to 200 grains a day.

*August 3d.* Vision in the right eye entirely lost. The patient was seen walking on the street staggering considerably, with a distinct inclination to fall toward the right side.

*8th.* The patient was made the subject of a clinical lecture at the New York Polyclinic; the partial reaction of degeneration on the right half of the face and the changed electrical response from the left auditory nerve were easily demonstrated to the students. There was no sign of any weakness in the facial muscles; the patient held a pencil, for instance, tightly between his lips on the right side quite as well as on the left, although the labial muscles showed the R. D. most markedly.

*22d.* The patient was admitted to the Mt. Sinai Hospital, where he was again subjected to a thorough course of specific treatment without any effect upon the course of the disease at all. Dr. Sachs saw the case with me at the hospital, and agreed with my diagnosis upon my demonstrating to him the changed electrical reactions on the right side of the face.

*September 10th.* The patient's condition is growing slowly worse; the staggering gait is now more constantly present; the headache is intense; the vision of the left eye is diminishing. The patient is as if "dazed," and shows more distinctly the air of absent-mindedness so frequently characteristic of brain-tumor.

*17th.* There is a slight but distinct paresis of the muscles of the right side of the face; it is most evident when the patient shows his teeth or puffs up his cheeks. The corneal reflex of the right eye is diminished as compared with the left; the cornea can be touched before the reflex occurs. There is no vomiting, but much headache and vertigo.

*October 1st.* The facial paresis is more marked. Tactile sensibility less acute on the right side of the face than on the left. The patient has some difficulty in swallowing.

The sensory symptoms indicate pressure upon the trigeminal nerve; the difficulty in swallowing shows pressure upon the glosso-pharyngeal nerve.

FIG. 3.



Showing site of opening in the skull made in Case II.

The patient's condition was so miserable that it was agreed to make an effort to relieve him by surgical means. After a number of experiments on the cadaver, which demonstrated the possibility of reaching the anterior portion of the base of the cerebellum from above by way of the tentorium, Dr. Gerster proposed entering the skull at the point indicated in Fig. 3, to raise the occipital lobe, if possible, sufficiently to enter the posterior cranial fossa by an opening through the tentorium and to excise and remove the tumor, if it could be reached; otherwise at least to relieve the intracranial pressure by a liberal opening in the skull. The patient was so miserable that he willingly consented to any effort to relieve his sufferings. On October 27th the operation was performed, no change of any consequence occurring meanwhile in the patient's condition. With the gouge, mallet, and rongeur a large opening, three and a half by two and a half inches, was made in the skull backward and

partly upward of the mastoid process; the bone was carefully removed from the lateral sinus with the end of the rongeur. The dura was of healthy color and bulged forth immediately very strongly from the cranial opening; its resistance to the pressure of a finger was like that of a board. As soon as the dura was opened by a crucial incision the brain-substance protruded and could not be held back. Dr. Gerster succeeded in raising the occipital lobe sufficiently to see the tentorium, which was seen and felt to be under great pressure from below. An incision was made in the tentorium to relieve the pressure in the posterior fossa, but it was not possible to complete the operation on account of the tremendous intracranial pressure, which rendered it impossible to raise the occipital lobe sufficiently to allow any further manipulating within the skull. The large hernia cerebri had to be ablated; the wound was packed and dressed. The hemorrhage during the entire operation was easily controlled.

FIG. 4.



Photograph of cerebellar tumor.

The patient rallied well from the operation and complained less of headache the next few days.<sup>1</sup> His temperature was normal. During a change of dressings, however, the wound was infected and meningitis developed, the temperature ranging between 100.5° and 104°; the patient became comatose and died November 10th, two weeks after the operation, the temperature rising to 107° just before death.

*Autopsy, November 10th*, ten hours after death, by Dr. F. S. Mandelbaum, Pathologist to the Mt. Sinai Hospital. Corpse emaciated; consid-

<sup>1</sup> The bedside history of the case, covering the time after the operation up to death, has been mislaid in the hospital, unfortunately, and the data given are based upon my recollection of the case.



erable rigor mortis. The surgical dressing was removed and the brain-substance beneath lying in the opening of the skull found covered with thick yellow pus. Opening in the skull three and one-half by two and one-half inches by measurement. General purulent pachymeningitis. Upon opening the posterior fossa the right cerebellar hemisphere bulges very strongly; the pial veins of the cerebellum, medulla, and pons engorged. Upon raising the brain a tumor of the size of a small apricot, involving the anterior half of the right cerebellar hemisphere, is found in the very position in which the symptoms during life had pointed. The tumor measures  $4.5 \times 4.0 \times 4.0$  cm.; it is not encapsulated, but it is distinctly separated from the surrounding cerebellar tissue in such a way that it could evidently be readily enucleated. The right half of the pons is considerably indented by the new growth; the right seventh and eighth nerves are flattened and thinner than the corresponding nerves on the left side; adhesions between the tumor and the dura were found in the neighborhood of the internal auditory meatus. The lateral ventricles are dilated; the whole brain is very succulent. The microscopic examinations (by Dr. Mandelbaum) showed the new growth to be a glio-sarcoma, in which the sarcomatous elements predominate. Sections from the facial nerve showed advanced degeneration of the myelin-sheaths, the axis-cylinders being but partially destroyed.

The points of interest in this case may be summed up as follows:

1. The occurrence of R. D. in the right facial nerve preceding the development of the first signs of paresis by almost two months, making an early diagnosis of the exact seat of the tumor possible. I have been able to find no other case of the kind in literature in which changed electrical reactions in any of the cerebral nerves were found preceding the onset of paralysis.

2. The hyperesthesia (increased excitability) and the reversal of the normal formula for the electrical responses from the left auditory nerve, which I am inclined to ascribe to the greatly increased pressure in the posterior fossa. It is difficult to say whether the changed reactions are due to the effect of pressure upon the auditory nerve itself or upon the lymphatic conduit connecting the labyrinth with the posterior fossa. In the latter case the changed reactions would indicate a condition resembling that of the choked disk (*Stauungs-papille*), a condition of lymphatic stasis in the labyrinth (*Stauungs-labyrinth*). Under all circumstances I believe it will be worth our while to examine the auditory nerves in cases of brain-tumor, especially in those in which a tumor in the posterior fossa is suspected; the presence of changed electrical reactions in one or both of the auditory nerves I would consider a valuable aid in the diagnosis.<sup>1</sup>

As to the operation performed, the tremendous intracranial pressure rendered all manipulations within the skull futile. If it were to be attempted over again, I should recommend preliminary tapping of the

<sup>1</sup> It must be remembered that these tests require a certain amount of intelligence on the part of the patient, for we must rely upon his power of perception of sounds.

lumbar region according to Quincke's method, in order to relieve the intracranial pressure to some degree; in the second place, it might be well to open the skull and dura in separate sittings, tapping the lateral ventricles before opening the dura. By taking these measures we might hope that the method, which is possible on the cadaver, would be more successful than it was in our case. The location of the tumor, I should like to add, in the ventro-cephalad part of the cerebellar hemisphere seems to be favored by new growths; Oppenheim,<sup>1</sup> Starr,<sup>2</sup> and Wollenberg<sup>3</sup> have observed cerebellar tumors at the very same point.

#### REMARKS BY DR. GERSTER.

The problem to be solved in the instance recorded in this history being the removal of a tumor probably located on the ventral surface of the cerebellum, a preliminary study of the topographical relations was made on the cadaver. The cerebellum can be approached and exposed by two routes. The one hitherto employed was a direct exposure of the cerebellum through the cranium composing the posterior cranial fossa. In tumors on or near the posterior aspect of the cerebellum this approach is the best, though the vicinity of the great foramen below, and of the transverse sinus above, serves to limit the size of the aperture. These limits and the dissection of the attachments of the posterior cervical muscles render the field of the operation deep and narrow, and the surgeon's manipulations will necessarily be cramped by the depth of the wound as well as by lack of space, especially when the tumor be large and deep-seated.

It was thought that if the cranium were opened by a generous fenestrum cut out just above the transverse sinus, exposing the upper surface of the tentorium, a tumor situated near or on its ventral surface could be attacked more easily. On the cadavers at my disposal, this route was found to be very feasible, and the occipital lobe being raised from the tentorium ready access was gained to any portion of the cerebellum.

Accordingly, I decided to attempt the removal of the tumor by the route just described.

The exposure of the transverse sinus from above was found very easy, the landmarks guiding the surgeon being unmistakable. The external occipital protuberance and the semicircular line corresponding to the transverse sinus, the craniotomic aperture should be laid just above this ridge. As soon as the occipital lobe was exposed, the opening could be safely enlarged down to the very edge of the sinus. But here we encountered an element of danger and difficulty not met with on the cadaver, and that was the enormous intracranial pressure.

<sup>1</sup> Oppenheim: *Nervenkrankheiten*, p. 541.

<sup>2</sup> Starr: *Brain Surgery*, p. 241.

<sup>3</sup> Wollenberg: *Arch. für Psych.*, xxi., p. 791.

The cerebrum was readily raised from the tentorium and was held up with a broad spatula, and the tentorium was opened by means of a large crucial incision, through which the cerebellar tissue at once bulged out and protruded, so as to render further steps risky and uncertain. It would have been necessary to remove a considerable portion of the cerebellum itself before an extirpation of the growth could have been even attempted. This and the considerable hemorrhage issuing from the much-distended vessels—mostly capillaries—of cerebellum, tentorium, and occipital lobe, finally and principally the crowding forward of the cerebellum filling up the narrow space of the wound, induced me to give up the attempt, which, though ending in removal of the growth, might also cause death on the operating-table.

The wound was drained by a large tampon of iodoform-gauze, which was brought out through the external wound, and the usual dressings were applied.

Subsequently we ascertained that the size of the tumor was so great that it would have been utterly impossible to remove it safely even through the largest possible craniotomy wound.

Though the plan pursued in this case was not successful, it may be stated, nevertheless, that the route here outlined is feasible, and cannot but be useful and successful in cases in which the tumor occupies the central parts of the cerebellum or the tentorial surface, and where its size does not preclude every possibility of safe operating.

CASE III. *Spindle-cell sarcoma of the left arm, face, and speech centres; successful localization; operation; death; autopsy.*—H. B., aged fifty years, peddler, native of Russia, was first seen March 17, 1894, at the Mt. Sinai Hospital Dispensary. The patient claimed to have been well till five months previously (October, 1893), when he was suddenly taken with the first spell of the character about to be described.

The patient has been married twenty-four years; he denies specific infection; does not remember having ever suffered any injury to his head. His wife states that she has borne him ten children, of which four were stillborn, two died when three and eight months old; four are living and well; the stillborn children were covered with an eruption and were born prematurely; all of the living children were covered with a rash at birth or developed one soon after. Mrs. B. aborted five times besides. A careful examination of the patient himself revealed no traces of syphilis. The youngest daughter has Hutchinson teeth. The examination of the patient's wife showed the presence of Argyll-Robertson pupils, with myosis and inequality of the two pupils, and the absence of both knee-jerks—in other words, she is suffering from locomotor ataxia, although she is entirely unaware of her condition. These points are emphasized because they bear strong evidence of a specific taint in the patient's family, and therefore presumably in the patient himself in spite of his assurance to the contrary.

In October, 1893, while enjoying perfect health, the patient was suddenly taken with a seizure in which his head and mouth were drawn violently to the right; the right arm jerked somewhat, the leg not at



all. The jerking lasted about five minutes, the patient remaining perfectly conscious. There was neither headache nor drowsiness after the spell. In all the patient has had up to date eight similar attacks, the last of which I witnessed at the dispensary the very first day I saw him. The seizure began with clonic contractions in the muscles of the right half of the face, and the head was drawn to the right side; after a few moments the right arm and leg began jerking, mainly in the shoulder- and hip-joints. The seizure lasted about four minutes, the patient retaining consciousness throughout. After the spell he seemed dazed and was not able to speak for a few minutes. He then gave a lucid history of himself without any hesitancy or difficulty of speech. He suffers occasionally from headache, which is not very severe; does not complain of vertigo, nausea, or vomiting. Examination shows flattening of the right half of the face as compared with the left. The electrical reactions normal; no other disturbance of any significance can be made out. Bearing in mind the family history and on general principles, mercurial inunctions, 3 grains a day, were ordered and an iodide-bromide mixture prescribed. The patient was seen two or three times at the dispensary, and then passed out of my view for six weeks. On May 18th he returned and reported that six weeks ago he had been suddenly taken very ill, losing the power of speech and suffering intensely from headache. According to the statement of his wife, the aphasia did not develop after an epileptic seizure. The patient was semi-conscious for three days, during which time he could not speak at all. The aphasia then gradually improved, the patient brightening up at the same time. A marked degree of aphasia remains, however, and the intelligent patient tells me he frequently wishes to say something but cannot find the words for it. His speech is hesitating and slower than before the onset of aphasia. The patient is more drowsy, falls asleep in his chair at table; he has grown phlegmatic and indifferent to his family and surroundings. His headache has been intense and constant; he is not able to locate it in any special part of the head. There is no nausea, vertigo, or vomiting.

Examination (May 18th) shows marked palsy of the muscles supplied by the two lower branches of the right facial nerve, the patient himself remarking that he must remove with his fingers food which is caught between his gums and cheek on the right side. The electrical reactions are unchanged. The right hand and arm are distinctly weaker than the left (dynamometer-test: R. 25; L. 40); the legs show no difference in strength. The right knee-jerk is exaggerated as compared with the left. The pupils respond promptly to light and accommodation. The ophthalmoscopic examination made by Dr. Koller shows absence of any indication of choked disk. When the entire head is tapped lightly with a percussion-hammer *the patient points to the region of the left lower motor area as being most sensitive to the blows*. The urine is free from albumin and sugar; there is no blue-line on the gums.

*Diagnosis.* The diagnosis was made of a tumor of the brain involving the face and probably the arm- and speech-centres in the lower half of the left central convolutions; on account of the involvement of speech, rather forward than backward of the fissure of Rolando.

The differential diagnosis was made between specific meningitis, brain-abscess, general paresis, and a vascular lesion (thrombosis), plumbism and uræmia being out of the question. A vascular lesion could be

readily excluded by the slow development of symptoms, the signs of cortical irritation preceding any loss of power by four or five months at least, and by the presence of the tender point on the skull. General paresis occasionally begins with focal epileptic seizures, but there was in our case an absolute absence of any somatic or mental symptom of general paresis, nor does a tender point on the head occur in uncomplicated paresis. The absence of any purulent focus in the body of the patient and of any traumatic history militated against the presence of an abscess; nor were there any variations of temperature to indicate an abscess in preference to a tumor. In view of the specific history syphilis of the brain, more especially specific meningo-encephalitis of the convexity, had to be carefully considered. Three very important points could be urged against its presence:

1. In syphilis of the brain, especially of the meninges, severe headache is an *early*, often predominating, symptom; in our case the patient did not suffer from headache of any consequence till partial paralysis had developed, nor was his headache at any time more severe at night, as is often the case in specific disease.

2. The course of syphilitic brain-disease is subject to great variations in the intensity of the symptoms; sometimes from day to day, or week to week, symptoms come and go and do not show the steady development observed in the case under question.

3. Specific meningo-encephalitis yields readily to energetic specific treatment, especially when applied early—our patient grew steadily worse under a thorough course of specific treatment. Nor were there any other signs of syphilis of the nervous system, as is so often the case, present to support the diagnosis of syphilis.

The diagnosis of tumor was based upon the following facts:

1. The slow and steady development beginning with symptoms of cortical irritation (focal epilepsy), followed subsequently by a gradually increasing paralysis of the very group of muscles originally the seat of convulsive jerking, which indicates a progressively destructive morbid process.

2. The simultaneous increase of general cerebral symptoms, notably of the headache and slow cerebration, with the further development of the focal symptoms.

3. The presence of a circumscribed tender point of the skull corresponding to the part of the brain to which the focal symptoms pointed.

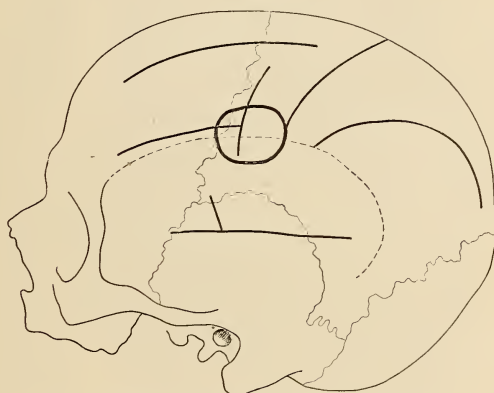
4. The exclusion of other forms of organic brain-disease.

The successive involvement of the motor centres (face, arm, and speech), the focal epileptic discharges and the presence of the tender point, indicated that the tumor was superficial, probably cortical, and not in the centrum ovale.

The patient was sent in to the Mt. Sinai Hospital, service of Dr. Howard Lilienthal, with the above diagnosis, and the request to subject him for ten days longer to specific treatment; if no change for the better occurred, to operate and remove the new growth. For reasons beyond my control, which need not be stated here, the proposed operation was put off again and again, and the unfortunate patient rubbed with enough mercury to cure him over and over again of syphilis. During this time the man's hebetude and stupor increased steadily; he would sit for hours without uttering a word; it required urging to induce him to talk at all; frequently he would not be able to call a given object by its right name,

but would nod approvingly if the name was told him. Finally he hardly said a word at all any more, which was partly ascribed to his stupor. In May he was still able to write with Hebrew characters. He understood and obeyed simple orders, but did everything slowly, with that peculiar air of absent-mindedness characteristic of the presence of a tumor. He was emotional and cried easily. The facial palsy became almost complete; the right arm was practically paralyzed; the patient dragged his right leg in walking. The knee-jerk was greatly increased and ankle-clonus developed on the right side. He complained, if he said anything at all, constantly of headache. If his head was tapped lightly with the percussion-hammer, he would now point to either side of his head, when asked where it hurt him; if his face was watched, however, *it was seen that he would screw up his face with an exquisite expression of pain, and that he would draw his head away from the hammer whenever a given point was tapped ever so lightly.* It was the same point he had formerly pointed out himself. No sign of papillitis developed till the end of July, when Dr. May reported a dilatation of the veins of the retina and a slight cloudiness of the left disk.

FIG 5.



Showing the opening in the skull in Case III.

Finally, on July 25th, the patient, who had fallen away considerably, was operated upon by Dr. Lilienthal. The head was shaved the day before the operation. Immediately before the operation I determined with Wilson's cyrtometer the location of the face- and arm-centres, which I selected on account of the complete paralysis of those parts. Dr. Lilienthal marked the centre of the area determined with a small preliminary cross-incision in the scalp. I then remarked it would be well to compare the area determined with the painful point, stating that, if they did not correspond, I would prefer Dr. Lilienthal entering the skull at the seat of cranial tenderness, which I considered a diagnostic point of supreme importance. I then began tapping the patient's head, and to our surprise he showed no sign of pain. Involuntarily I had avoided the immediate vicinity of the small incision in the scalp, as it was bleeding somewhat; I now tapped at this point, and, to our gratification, the patient immediately drew his head away and screwed up his face as he had always done when examined before.



After raising a liberally sized flap which bled profusely, Dr. Lilienthal opened the skull with the hammer and chisel at the point agreed upon (Fig. 5). Everything bled, the flap, the diploe, and two branches of the middle meningeal artery, and the hemorrhage was stopped with great difficulty. The exposed dura did not bulge or pulsate, nor was it discolored. An aspirating-needle was introduced in every direction, but no resistance was felt; in perforating the dura with the needle it felt tough and thickened. The exposed area was soft to the touch, at the anterior superior edge of our opening there seemed to be somewhat more resistance. The patient had lost so much blood and his condition was so bad that we decided to open the dura at a subsequent sitting, if the patient survived the present operation. Unfortunately, in spite of transfusion being made, the patient never regained consciousness and died twenty-nine hours after the operation, the temperature rising above  $106^{\circ}$  F. immediately before death.

FIG. 6.

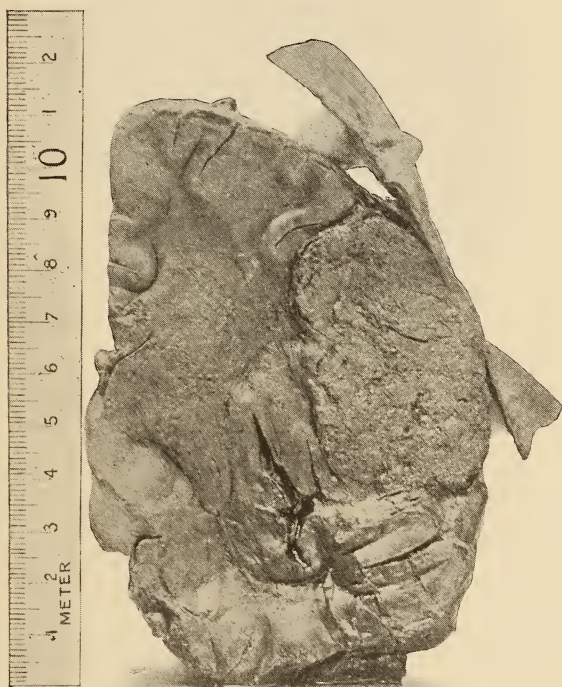


Showing the site of the tumor on the surface of the brain in Case III., and the part beneath the cranial opening.

The *autopsy* was made two hours after death by Dr. Yankauer: The cranial wound was sweet and aseptic; no further hemorrhage had occurred. A small ring of clotted blood was adherent to the dura along the margin of the opening in the bone. The skull-cap was raised and the brain removed *in toto*. On the left side of the brain, at the point corresponding to the opening in the skull, as indicated by the ring of clotted blood, the dura was adherent to the substance beneath and was slightly discolored. There was nowhere any sign of meningitis. The convolutions of the left hemisphere were flattened. In the left motor region a large tumor involving the lower half of the ascending frontal convolution, the operculum, the base of the second and third frontal convolutions, and the tip of the temporo-sphenoidal lobe was found; posteriorly the tumor is bounded by the furrow of Rolando, which is crossed at no point. The centres involved are the arm, face, tongue, and motor speech-centres; the last is entirely destroyed. The tumor is softer to the touch than the surrounding brain-substance, is of the color of the

latter, only mottled and of a dirtier tinge. No distinct capsule is present, but the growth is sharply separated from the brain-substance, and was partly enucleated after hardening very readily (Fig. 8). The tumor is 7 cm. long from above down and somewhat forward, 4.5 cm. broad at its broadest point, and 4 cm. deep. The dura is adherent to the upper half of the tumor, the part involving the face- and arm-centres. The adherent area corresponds to the opening made in the skull and at the same time to the upper, anterior, and posterior limits of the tumor; the latter extends downward below the lower margin of our opening 3

FIG. 7.



Photograph of part of tumor in Case III., showing the adherent dura.

cm. to 4 cm., so that we would have been obliged to enlarge the opening considerably if the removal of the entire new growth had been attempted.

The microscopic examination shows the tumor to be a spindle-cell sarcoma throughout; numerous sections made through the part to which the dura was adherent show the dura and the pia thoroughly infiltrated with sarcomatous elements, but the new growth very evidently did not originate in the coverings of the brain. The clinical course of the disease bears strong evidence, however, that the disease began in the face-centre and subsequently invaded the speech- and arm-centres.

FIG. 8.



Side view after enucleation of the tumor.

The case is instructive, I believe, in several respects. *In the first place*, it demonstrates the important fact *that optic neuritis may be absent in the presence of a large brain-tumor*, a fact demonstrated also by cases of Gowers<sup>1</sup> and Pel;<sup>2</sup> if such is the case, the absence of choked disk does not justify the postponement of an operation when the symptoms of a focal lesion are sufficiently clear and the diagnosis of a new growth otherwise well founded. *In the second place*, the case demonstrates the fact that a previous history of syphilis does not preclude the presence of a non-specific growth; in Case II. a history of syphilis was also obtained and a glio-sarcoma found at the autopsy. This raises the important question, How long should these cases be subjected to specific treatment before operation is performed? Horsley says six weeks, Starr<sup>3</sup> favors three months. My own experience with cases of syphilis of the brain<sup>4</sup> giving symptoms of focal organic disease has been that they respond with few exceptions remarkably quickly to energetic specific treatment consisting of inunctions of 3 to 5 grammes of blue ointment and iodide of potas-

<sup>1</sup> Gowers: Diseases of the Nervous System, vol. ii. p. 505.

<sup>2</sup> Pel: Berliner klinische Wochenschrift, June 29, 1894.

<sup>3</sup> Starr: Brain Surgery, p. 206.

<sup>4</sup> See article "Syphilis of the Brain." New York Medical Journal, July 18, 1895, p. 33.



sium or sodium in doses of 300 to 400 drops of the saturated solution a day. The rapid improvement in the condition of these patients is often astounding; in one case which I have in mind the symptoms resembled those in the case in question in many respects, intense headache, aphasia, paresis of the facial muscles and right arm, and choked disks being present; the patient was found in profound coma the second day I saw him with a pulse as low as 40 (heart-beat counted and 10 respirations to the minute); inunctions were commenced the same day and the iodides added as soon as the patient was able to swallow them; within a week the headache was gone and the aphasia and hemiparesis were greatly improved; within three weeks the patient was able to return South with but few traces of the disease left. Other cases of the kind might be mentioned, but no doubt many of the gentlemen present have had similar experiences. I should like to urge, therefore, that if no improvement in the symptoms, especially in the headache, is obtained within three weeks, none is likely to occur, providing the specific treatment is energetic and the patient is not cachectic at the time the treatment is commenced. Prolonged mercurial treatment in non-specific cases is apt to influence the general condition unfavorably and to weaken the patient's powers of resistance to the shock of subsequent surgical interference. In our case the patient should have been operated upon in May, as soon as the diagnosis of a new growth had been made with certainty and thorough specific treatment had failed to stay the course of the disease.

The absence of headache for the first five or six months, and of nausea, vomiting, and vertigo throughout is another point of interest in the case. This simply supports the view expressed in connection with Case I., that symptoms present are of greater value in arriving at a diagnosis than the absence of other symptoms, which might be looked for.

The inefficiency of probing for a tumor with an aspirating-needle could not be demonstrated more conclusively than shown by this case—although the tumor was immediately beneath our opening, the needle gave absolutely no information as to its presence. The greater resistance to the touch felt at the anterior superior margin of our opening was offered by the normal brain-substance, which was harder than the tumor.

In conclusion, the three cases reported show, I believe, the truth of the statement that brain-surgery in order to be successful requires an early diagnosis and early operation. The best result was obtained in Case I., because it was operated upon as soon as the diagnosis of an organic lesion was assured and specific treatment had failed.

#### REMARKS BY DR. LILIENTHAL.

It is my belief that if we are ever to have success in this field of surgery, operation must be undertaken early. Where a cortical lesion can be accurately localized, to wait for general symptoms such as may be

expected to arise from pressure, or to wait for the systemic poisoning known as cachexia, is to lose the possibility of anything more than palliation. As in gastric cancer it is usually too late for a curative operation when a tumor is palpable, so in circumscribed cortical lesions of a non-syphilitic nature choked disk and vomiting indicate the existence of something which might better have been attacked before the super-vention of these symptoms. I do not deny the value and even the necessity of tentative antisyphilitic medication, but I believe that where no direct history points to syphilis as a cause of the trouble, weeks, not months, might better measure the time of trial.

The death of this particular patient can, I believe, be ascribed almost entirely to the furious bleeding from enormous newly formed vessels in the diplœ. The actual amount of blood lost was not greater than I have frequently seen in operations on persons of the general physique of this man, but his condition was poor and his powers of resistance lower by far than I had estimated. The hemorrhage was controlled as well as possible by gauze-compression over the cut surface of the bone, but at every fresh bite of the rongeur the flow from the same vessels again divided was so severe that before the time came to open the dura the pulse had flagged to such an extent that the operation had to be suspended. It was my intention to open the dura in a day or two, thus making the operation in two stages, but the death of the patient from acute anæmia, in spite of repeated intravenous saline infusion, put an end to everything. It would in such cases be better to operate in two or three or even more stages. By great care the slightly increased danger of sepsis could, I believe, be overcome, and even with sepsis there is a better chance of ultimate success than with dangerous hemorrhage. Since my sad experience with this patient, I have in other cranial cases employed a wax recommended by Dr. R. H. Cunningham, of this city, and I am so pleased with the prompt and easy manner in which it can be used to check bleeding, that I shall be unwilling to undertake another operation on the skull without having a supply at hand. This wax is made by boiling in a test-tube sheets of soft white wax, such as is used in the manufacture of artificial flowers. It turns slightly brown in the boiling. A little castor oil—about one drop to the gramme—is added to this liquid wax and the whole is allowed to cool. The upper part of the test-tube is then heated to sterilize it thoroughly, and is cotton-plugged. These tubes of wax will keep indefinitely. When it is desired to make use of it, a glass rod is to be heated and melted into the solid wax after removing the cotton plug. When the rod is firmly *set* in the wax, its end projecting some inches from the open end of the test-tube, hold the test-tube in the flame, using the rod as a handle. Thoroughly heat the tube, beginning at its mouth and slowly revolving it on its long axis. When the wax is reached quickly heat this part of the tube and pull

the thimble of wax out by means of the rod. This wax may now be put into sterile hot salt-water, and should be kneaded until it is of the right consistency. At each bite of the forceps a little wax is to be pressed with the finger into the bleeding bone. The wax is aseptic and may be left in place.

## SYPHILIS AND THE ETIOLOGY OF ATHEROMA.

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IN this paper I purpose shortly to consider the nature of arterial atheroma, more especially with regard to the part, if any, played by syphilis in its causation. Everyone is familiar with the appearance of atheroma in the aorta, the formation of thickened patches, the fibrous, pulpy, or calcareous formations in its inner coat. It is not my intention to describe these changes, which have already so often been described both macroscopically and microscopically, but to discuss certain questions in their etiology.

The importance of the part played by syphilis in the causation of aneurisms<sup>1</sup> must certainly be acknowledged, and hence some would argue that syphilis exerts a like influence in the production of arterial atheroma, but the latter conclusion is not a fair one. In order to show that such a conclusion is not justified it becomes necessary to make a digression and to discuss shortly the rôle of syphilis in the causation of aneurisms.

For this purpose it will be best to confine ourselves to aneurisms of the aorta, so as to exclude, as far as possible, aneurisms due to traumatism, bruising, and embolism, and especially to exclude those caused by septic inflammation of the arterial walls, set up by emboli in cases of infective endocarditis.<sup>2</sup> Aortic aneurism occurs chiefly at the middle period of life; out of ninety-two cases analyzed by Dr. Thomas Hayden, sixty occurred between the ages of thirty and fifty,<sup>3</sup> whereas the same author found that atheroma was most common after the age of sixty. In spite of this, however, Dr. Hayden evidently considered aneurism to be due to atheroma, or at least to antecedent changes in the vessel-walls,

<sup>1</sup> The statistics on this subject are, of course, as liable to error and as hard to ascertain correctly as those of antecedent syphilis in cases of *tabes dorsalis*. Professor Clifford Allbutt tells me he would say that in 90, or even 95, per cent. of aneurisms there has been previous syphilis. See also F. H. Welch, "On Aortic Aneurism in the Army." *Med.-Chir. Trans.*, 1876, vol. lix.

<sup>2</sup> See J. Langton and W. Bowlby, "Multiple Embolism of the Arteries of the Extremities." *Med.-Chir. Trans.*, 1887, vol. lxx.

<sup>3</sup> See "Diseases of the Aorta," in Quain's *Dictionary of Medicine*, first and second editions. Other statistics agree in pointing to the period between the ages of forty and fifty as the commonest for aortic aneurism.



of which atheroma may be looked on as the type ; this is what he said : " Thus, whilst deterioration of the arterial coats as typified in atheroma is most common after the age of sixty, one of its ordinary consequences, aneurism, belongs to an earlier period of life. The apparent discrepancy may be explained by the more frequent employment of men under fifty in severe labor, and their greater capacity for extreme muscular effort earlier in life, the condition of the arterial wall which favors aneurism having been already established."

That violent efforts and high blood-pressure are most important factors in the causation of aortic aneurisms there can be no doubt,<sup>1</sup> but I believe that the explanation given by Dr. Hayden is not sufficient to account for the discrepancy acknowledged by him between the favorite age for aortic aneurism and the period of greatest frequency of aortic atheroma. It appears to me more natural to conclude that ordinary atheroma is not, after all, the commonest cause of sacculated aneurism of the aorta, but that a localized inflammatory infiltration of the aortic wall<sup>2</sup> usually precedes the aneurismal dilatation.

There seems to be nothing against the view that such patches of sub-acute aortitis represent sometimes a true tertiary syphilitic process of the nature of a gummatous infiltration, and this view best explains the importance of syphilis as an etiological factor in aortic aneurisms.

In 1868 Prof. Clifford Allbutt,<sup>3</sup> when describing the histological character of the diseased cerebral vessels in a syphilitic man, aged thirty-one years, drew attention to a condition of chronic arteritis with great nuclear and cellular proliferation, which affected all the coats to some extent,

<sup>1</sup> Hence the much greater frequency, so often alluded to, of aortic aneurisms in men than in women, and in men who make great muscular efforts than in men who do not. This is confirmed by the fact that the aortic arch, where naturally the strain is greatest, is the most common site for aneurisms. Strain probably acts likewise as a predisposing cause of atheroma. The arteries of the lower extremities, which are more liable to strain than those of the upper extremities, are likewise more liable than the latter to atheroma ; the pulmonary artery, where the blood-pressure is much lower than in the aorta, is seldom affected by atheroma, except when the blood-pressure in the pulmonary artery is pathologically increased by pulmonary emphysema, disease of the mitral valve, etc. (See S. Wilks and W. Moxon, "Lectures on Pathological Anatomy," 3d ed., 1889, pp. 155-57.) Precisely how strain can induce atheroma remains doubtful. A discussion as to whether a chronic inflammatory process plays an intermediate part in these cases would be unprofitable, but we may bear in mind that, though moderate functional activity and mechanical movements must be regarded as natural stimulants tending to the proper nutrition of the tissues, excessive functional activity and mechanical strain may probably cause malnutrition and irritation, giving rise to chronic degenerative and inflammatory changes. It is not then a matter for surprise that strain sometimes helps in the production of atheroma ; the part, however, which it plays in the production of atheroma is probably quite different to the part which it plays in inducing aneurism. In the latter case the usual action of strain is most likely the mechanical thrusting out of a part of the vessel-wall already softened by some true inflammatory process.

<sup>2</sup> The very first stages of a sacculated aneurism of the aorta are, however, not likely often to fall under the notice of the pathological anatomist.

<sup>3</sup> "Cerebral Disease in a Syphilitic Patient," St. George's Hospital Reports, 1868, vol. iii. p. 61. What appear to have been miliary gummata had already, in 1863, been noticed by Dr. S. Wilks in the bloodvessels of the brain in the case of a syphilitic woman, aged 38. See Guy's Hospital Reports, 1863, 3d series, vol. ix. p. 45.

but especially the middle and inner coats. He said, "The distinction between the coats was in many places lost; in other places the inner was detached from the middle coat by a nest of nuclei and granules. . . . in other places, again, pear-shaped processes, thrust inward from the middle and inner coats, projected into the lumen of the vessel, carrying the inner coat before them. . . . Their contents were chiefly of an opaque granular character. I found, however, no dark layers of fatty degeneration like those we see in common atheroma; and on the whole the degeneration was not of so low a kind as in atheroma, the products being generally of higher physiological value." Although this account and the subsequent paper by Heubner,<sup>1</sup> of Leipzig, described syphilitic disease of the small arteries, it may be inferred that there is also likely to be a difference between a chronic or subacute syphilitic inflammation in the aorta and ordinary atheroma.<sup>2</sup>

I now return to the original question: the nature of aortic atheroma and its relation to syphilis. The digression was undertaken to point out that syphilis may play a much greater part in the production of aortic aneurism than it does in the production of atheroma, not to urge that syphilis was of no account in the causation of atheroma.

Any local inflammation seems to predispose to chronic atheromatous changes. It is an old observation that atheromatous changes are very likely to be found in valves which have been slightly affected by previous rheumatic endocarditis. Chronic atheromatous thickening is not rarely seen in congenitally malformed cardiac valves, such as when there are only two instead of three aortic or pulmonary valves. In these cases one of the valves is often divided into two parts by what John Hunter, in describing the condition, termed a "crossbar."<sup>3</sup> Probably such valves are sometimes the result of intrauterine endocarditis,<sup>4</sup> the "crossbar of Hunter" representing the part where two valves during foetal life have undergone inflammatory adhesion so as subsequently to form a single valve in the adult; it seems, therefore, fair to consider that when such valves undergo chronic thickening the intrauterine inflammation, like ordinary rheumatic endocarditis, or any other inflammation, has acted as a predisposing cause to the subsequent degenerative changes of atheromatous nature supervening in adult life.

A patch of syphilitic aortitis, besides its chances of giving rise to an aneurism, would, like any other inflammation, predispose to a subsequent atheromatous process, and this is, I believe, the chief part played by syphilis in the causation of atheroma.

<sup>1</sup> Professor O. Heubner: *Die leutische Erkrankung der Hirnarterien*, Leipzig, 1874.

<sup>2</sup> See S. Wilks and W. Moxon: *Lectures on Pathological Anatomy*, 3d ed., 1889, p. 152.

<sup>3</sup> Sir James Paget, in 1844, drew attention to the frequency of disease affecting the aortic and pulmonary valves, when there were congenitally only two instead of three of them. *Med.-Chir. Trans.*, vol. xxvii. p. 188. See also Dr. J. B. Peacock: *Monthly Journ. Med. Science*, May, 1853, vol. xvi. p. 387.

<sup>4</sup> See Dr. J. B. Peacock: *Monthly Journ. Med. Science*, May, 1853, vol. xvi. p. 385.

Some would make of atheroma itself a chronic inflammatory process, but of this I think there is not sufficient evidence. As in the case of arterio-sclerosis, and as in some cases of granular contracted kidney,<sup>1</sup> and of chronic fibroid changes in the cardiac muscle,<sup>2</sup> the question arises in this case, also, what definition of inflammation we are to accept as our criterion in judging whether inflammation is present or not. The "ruber, tumor, calor et dolor" of Celsus, though still of great service as ordinary clinical tests for inflammation when occurring in extensive areas accessible to touch or view, is hardly satisfactory as a scientific definition. For the present purpose I would prefer such a modification of modern definitions as that suggested in my recent paper on "Arterio-sclerosis,"<sup>3</sup> namely, that inflammation is "the series of tissue-changes caused by an injury or by the presence of some harmful irritant, and usually leading to an accumulation of cells in the part affected."

This includes the cell-accumulation resulting from proliferation of the fixed cells as well as that resulting from the migration of leucocytes. It includes tuberculous affections and the other infective granulomata; it will also include cancer and sarcoma, if ultimately the presence of coccidia-like organisms should be proved to be necessary to their development. The occurrence of necrobiosis, secondary to inflammation or due to the same original cause, will not confound the definition.

If we accept such a definition, does atheroma fall under the head of inflammation? The cell-accumulation is certainly present, but an injury or irritant cause is probably not essential to the production of atheroma, unless, indeed, deficient nutrition be regarded as an irritant cause. Mere malnutrition and deficient nutrition are causes of necrobiotic and degenerative changes, acute and chronic; but, if they should be regarded as irritants, it would become hard, indeed, to separate chronic inflammatory from degenerative processes.

It is doubtful whether in many conditions it is possible to draw a hard-and-fast line between chronic inflammation of tissue and chronic degeneration of tissue. One can understand that the blood by deficiency in quantity, or, at least, by deficiency in its chief nutrient components, may give rise to a process of simple malnutrition. Besides being merely deficient in quantity or nutrient quality the blood supplied to the tissues may contain injurious substances either owing to excessive formation in some tissue of the body of a natural toxic product of tissue-metabolism, or to its deficient excretion from the body,<sup>4</sup> or to the formation by diseased tissue-metabolism of toxic sub-

<sup>1</sup> Especially those cases chiefly seen in old people, in which the capsule of the kidney strips off quite readily, though the surface of the cortex appears somewhat pitted or granular, and the cortex of the whole kidney is slightly diminished in size.

<sup>2</sup> See H. Huchard: *Maladies du Cœur et des Vaisseaux*, 2d ed., Paris, 1893, pp. 170 *et seq.*

<sup>3</sup> *THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES*, September, 1894, p. 287.

<sup>4</sup> Or to deficient washing out of products of catabolism from some particular organ. Thus, the increase of fibrous tissue taking place in the liver and spleen from passive congestion



stances (true auto-intoxication) not formed at all in the healthy body, or, lastly, owing to the formation within the body of toxic products resulting from the metabolism of parasitic microbes. Such toxic substances circulating in the blood may, of course, act as irritants and cause inflammatory changes in the tissues, the effects of inflammation then becoming added to those of simple degeneration. It is not surprising, therefore, that just as the causes of simple degeneration may be associated with those of inflammation, so the pathological alterations in tissues due to mere degeneration are frequently associated with those due to inflammation.

The difficulty of distinguishing between a simple degenerative process and the results of chronic inflammation is especially great in the case of atheroma, which is certainly often accompanied and preceded by undoubted inflammatory changes. Dr. W. Moxon<sup>1</sup> thought that atheroma was in continuity with arteritis, graduating from a condition in which no inflammatory results can be found into one in which inflammation is distinctly present. According to Dr. Thomas Hayden,<sup>2</sup> however, "Atheromatous transformation of the coats of arteries is a result of malnutrition, and essentially degenerative," though "not infrequently the products of a low form of inflammation of the internal and middle coats are combined with those of tissue-degeneration." Dr. Douglass Powell<sup>3</sup> considers atheroma of the aorta to be a degeneration, the result most commonly of preceding inflammatory change, but sometimes occurring primarily as fatty transformation from senile decay.

The difficulty is increased, since it is possible that in cases of tissue-degeneration the products of degeneration may themselves, if unremoved, even without the presence of microbes, act to some extent as irritants to the surrounding tissues. In this way a condition of secondary chronic inflammation would be induced, although the primary condition was one of simple degeneration. On the whole, although atheroma may be frequently preceded or even accompanied by inflammation<sup>4</sup> the weight of evidence seems to be that it may likewise occur as a primarily degenerative process.

It is probably best to look on such primary atheroma as a process occurring in the larger arteries corresponding (etiologically, though not anatomically) with arterio-sclerosis<sup>5</sup> in the arterioles. According to this

may be due not merely to the passive hyperæmia, *per se*, nor to increased vascosity of the blood, but rather to the accumulation of the products of tissue-catabolism occurring in the congested organs owing to the local stagnation of the blood.

<sup>1</sup> Guy's Hospital Reports, 1871, vol. xvi.

<sup>2</sup> Diseases of the Heart and of the Aorta, 1875, p. 1073.

<sup>3</sup> Reynolds' System of Medicine, 1879, vol. v. p. 19.

<sup>4</sup> Virchow and Niemeyer, however, considered inflammation a necessary antecedent to the changes found in atheroma. See R. Virchow's *Die Cellular Pathologie*, 1858, p. 319; and Felix von Niemeyer's *Lehrbuch*, 9th ed., Berlin, 1874, pp. 443 *et seq.*

<sup>5</sup> In the present paper the word "arterio-sclerosis" is used as synonymous with the arterio-

views the same condition of malnutrition (whatever the primary cause of this malnutrition may be) which induces arterio-sclerosis in the walls of the smaller vessels may act on the coats of the aorta and larger vessels so as to induce atheromatous changes.

With regard, however, to the anatomical difference between the process of arterio-sclerosis in the small vessels and that of atheroma in the large ones, it must be remembered that, since the walls of the larger arteries are thicker than those of the smaller ones, the former are especially dependent for their nutrition upon the condition of their vasa vasorum.<sup>1</sup> The peculiar feature of atheroma is the cell-accumulation which takes place in the deeper part of the tunica intima (*i. e.*, that part of the intima nearer to the tunica media) of the affected artery. This is the portion of the arterial wall which is naturally worst nourished, for its blood-supply must be obtained from the vasa vasorum, whereas that of the immediate inner surface of the artery is derived from the blood which constantly bathes it. Consequently, when the vasa vasorum of a large artery are in any way stenosed the deeper (external) layer of the tunica intima is the first part to suffer in its nutrition. It has, indeed, been pointed out<sup>2</sup> that the position of the cell-accumulation in atheroma may be partly due to stenosis of the vasa vasorum by Bright's disease or syphilis.

Stenosis of the vasa vasorum, from whatever cause, is, then, likely to induce atheromatous change in the part of the arterial wall in which the vasa vasorum are affected. H. Huchard,<sup>3</sup> of Paris, has gone so far as to make of atheroma a "localization of arterio-sclerosis;" that is to say, he makes it due to a process of arterio-sclerosis affecting not to the same extent the arterioles over the whole body, but localized to the vasa vasorum of certain arteries, the stenosis of the vasa vasorum causing atheromatous changes in the walls of the affected arteries.

It is evident that alterations in the quality of the blood induced by gout, syphilis, and alcohol, and all the asserted causes of arterio-sclerosis may likewise be alleged as causes of atheroma. On these questions<sup>4</sup> I shall not enter in the present paper, but shall content myself with having

capillary fibrosis described by Gull and Sutton in 1872 (*Med.-Chir. Trans.* vol. lv.). This restricted use of the term is both usual and convenient.

<sup>1</sup> This difference in the conditions of nutrition between the main arteries and the small arteries has been aptly compared to the laws which the Romans made for the maintenance of their celebrated roads. The large arteries have their vasa vasorum, just as the Roman *primæ viæ* had their independent maintenance; whereas, just as the *viæ vicinales* had to be kept in repair by the neighboring populations, so the nutrition of the walls of the smallest arteries largely depends on the state of the organ which they themselves supply. See S. Wilks and W. Moxon, *op. cit.* 3d ed., p. 159.

<sup>2</sup> See Dr. F. W. Mott's paper on "Cardio-vascular Nutrition," *Practitioner*, 1888, vol. xli. pp. 161-173.

<sup>3</sup> *Maladies du Cœur et des Vaisseaux*, 2d ed., Paris, 1893, pp. 96 *et seq.*

<sup>4</sup> To some extent I have entered on these questions in *THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES*, September, 1894.

summed up, I hope intelligibly, the evidence in favor of the views (certainly not new ones):

1. That atheroma of the aorta, though often preceded or accompanied by inflammation, is itself a merely degenerative process: that syphilitic or other inflammation may locally predispose to atheroma.

2. That aneurism of the aorta is induced more often by the yielding of a portion of its wall affected by syphilitic or other inflammation than of a portion affected by simple atheroma.

## SUPRAVAGINAL HYSTERECTOMY FOR IMPOSSIBLE LABOR, WITH INTRAPELVIC TREATMENT OF THE STUMP.<sup>1</sup>

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### I. THE TECHNIQUE OF THE OPERATION.

IN opening the discussion upon the technique in hysterectomy for impossible labor, it would not be profitable to enter extensively into the early history of this subject, for the profession is already quite familiar with it. Nor have I anything new to present, as the technique which I shall describe and recommend will be practically the same as that which was advocated in the operation for fibroid tumor, in a paper read before the American Gynecological Society in 1892,<sup>2</sup> and which has been generally accepted as the best method of treating the stump in all cases in which supravaginal hysterectomy is indicated in the non-pregnant uterus.

The advantage of dropping the cervix within the pelvis and leaving it in its natural position and relations had long been recognized; but when the cervical tissues were ligated *en masse* or in sections, as was practised by Schröder and his followers, the mortality from hemorrhage and sepsis was so great that the extraperitoneal method of constricting the stump with a *serre-nœud*, and fixing it in the lower angle of the abdominal incision, became and remained the method of expediency until it was shown that hemorrhage could be controlled and sepsis obviated by a procedure which left the cervix entirely free and intrapelvic. The mortality of this intrapelvic method is at *least* as low as that of the extraperitoneal fixation method, and the advantages are so infinitely greater that no one who has had experience with it could be induced to return to the older way.

That this method could be safely applied in the Porro-Müller opera-

<sup>1</sup> Read before the College of Physicians of Philadelphia, February 5, 1896.

<sup>2</sup> "Supravaginal Hysterectomy without Ligature of the Cervix; a New Method." By B. F. Baer, M.D. Transactions of the American Gynecological Society, 1892-93.



tion I was at once convinced, for the first case upon which I operated was one of pregnancy at the fifth month in which labor was rendered impossible by the presence of a fibroid tumor which impacted and obstructed the pelvis, and in which the symptoms became so urgent that radical measures for immediate relief became imperative. This was not a full test, I grant, for the tissues of the cervix had not yet attained the size and vascularity which obtain at the full term of gestation; but later experience has fully established this question, for uniform success, I believe, has followed in all the operations at full term in which the cervix was treated in this way, and the recovery of the patients was as uneventful as so usually occurs in the removal of the uterus in the non-pregnant state by this method.

The question as to choice of the operation will be discussed by my colleague, Dr. E. P. Davis. I shall therefore proceed at once with a definition of the technique, and follow with a brief record of two cases. scrip-

In order that the best success may be won, it is necessary that the diagnosis of impossible labor and a decision as to the choice of the operation shall be made previous to the full term of gestation, or at least before labor has begun, so that the environment and preparation of the patient may be rendered as perfect as possible. It is also necessary that efforts at delivery per *vias naturales* should have been avoided. The same arrangements should be made, if possible, as to the operating-room, Trendelenburg apparatus, and other operative equipment as for ordinary hysterectomy in fibroid tumor, and two more assistants are required than for the former operation; one to control hemorrhage by grasping the broad ligaments and cervix, the other to take the child from the hands of the operator as soon as it is delivered. If the patient does not object, she should be placed on the table before the anæsthetic is begun. The assistants and nurses should be previously informed regarding their various positions and duties during the operation, so that nothing may occur whereby the life of the child might be endangered. When the patient is anæsthetized, the operator takes his position on the right side of the patient, his instrument-tray being close to his right hand. Two assistants stand opposite; a third stands at the right of the operator, ready to receive the child. An incision, long enough to deliver the uterus, is now quickly made and observation is taken as to the presence or absence of adhesions. If any adhesions exist, they must be separated before the uterus is delivered. The organ is then tilted slightly, so that a cornua emerges, when the remainder passes through easily. As soon as the uterus has emerged an assistant immediately brings the edges of the abdominal incision together under it. A large sterilized gauze-pad, which has been prepared for the purpose, is then placed under the uterus. This protects the abdominal cavity and serves as an absorbent of the discharges from the foetal envelope. The other opposite

assistant quickly encircles the broad ligaments and cervix with the left hand and makes sufficient constricting pressure to control hemorrhage. Incision is next quickly and carefully made through the uterine wall in the median line, beginning near the fundus and extending downward. The right hand now ruptures the membranes and seeks preferably the feet of the child, by which it is delivered. If the placenta happens to be in the way, it is pushed aside or broken through, and no other attention given to it at this moment. The child is passed to the assistant in waiting to receive it, when the cord is clasped by a hæmostatic forceps and severed; such measures as may be required for the resuscitation of the child being at once applied by the assistant in charge of it. The placenta is next delivered and the uterine cavity thoroughly emptied and cleansed. The uterus will now probably be found firmly contracted, and the operation may be continued without attention to the uterine incision, the assistant still grasping the pedicle.

When ready to proceed with the hysterectomy the pelvis should be elevated, but not to the extreme degree that is called for in the Trendelenburg posture. The latter is seldom necessary and may be harmful. Careful examination should now be made so that a clear idea may be obtained as to the location and relation of the broad ligaments before the ligation is begun. This is especially necessary if the labor had been rendered impossible because of fibroid tumor. The first step in the hysterectomy is the passing of a single silk ligature through the broad ligament near the cervix, which, being tied, controls the ovarian artery and veins. The ligament is then severed just below the tube and ovary, the incision being carried close to the cervix. The knife is then run lightly across the lower segment of the uterus, an inch or two above the peritoneal reflection of the bladder, care being taken to incise the peritoneum only. The latter is then stripped down with the handle of the scalpel. The purpose of this is twofold: first, it insures protection to the bladder and forms the peritoneal fold which is to cover the raw end of the cervix after the uterus has been amputated; and, second, it facilitates the next and most important step, viz., the ligation of the uterine artery. If the artery is prominent and easily reached, it may be ligated separately within the folds of the broad ligament; but if it is deeply situated and cannot be easily isolated, which is often the case, the finger and thumb then grasp the broad ligament on its anterior and posterior surfaces and locate the vessel by its pulsation. A ligature is then passed through the entire broad ligament below the artery, and just outside of but close to the cervix, care being taken to avoid the cervical tissue on the one hand and the ureter on the other. The ligature is now tied. Similar steps are taken to secure the vessels on the opposite side and the cervix is then amputated just above the vaginal attachment. A small posterior fold is formed by stripping up the peritoneum while the

amputation is being made. The stump is now held in the grasp of a small tenaculum forceps until the technique is finished. As a rule, if the main arterial branches have been properly ligated, the raw end of the cervix will be found dry; but if any hemorrhage is present, of course additional measures must be taken to control it. If a vessel is found spurting, it is ligated. If oozing from the stump is general and *persistent*, which is more likely to be the case in the puerperal cervix—it is very rarely so in the non-pregnant—catgut sutures should be passed through the cervical tissue to control it. These sutures must be placed so as *not to include* the peritoneal folds, and are to be covered by these folds in the final technique. They should also be placed on either side of the cervical canal so that it may not be occluded. When all bleeding has ceased the peritoneal folds are closely adjusted over the stump, and as many Lembert sutures are placed as are necessary to maintain this *close* adjustment. The number required will depend upon the manner in which the uterine arteries were ligated. If the ligatures securing these arteries have also passed through the broad ligament, the peritoneal folds will be found taut, so that when drawn over the stump they will fit closely and press firmly against each other. Under these circumstances the adjustment may be so firm that further suturing is unnecessary, the edges being merely infolded; but if this firm and close adjustment does not exist, then, of course, it must be secured by as many Lembert sutures as are, in the judgment of the operator, necessary. Nothing whatever is done to the cervical canal if the tissues are in a healthy state; but if efforts at delivery have been made, or if the child was dead and septic discharges have been occurring, the canal and vagina must be thoroughly disinfected. The stump is now released, when it immediately recedes into the pelvis and occupies its normal position. After toilette of the peritoneum the abdominal incision is closed and dressed in the usual way. Drainage is almost never necessary.

In the original description of the technique the following sentence occurs: "The steps of the operation vary somewhat, to suit the complications which may be present in the individual case, but the general direction and the conclusion are practically the same in all cases."<sup>1</sup> If it had been thought necessary to elaborate this statement, it would have been written somewhat as follows: The termination of the technique by which the cervix is left without a ligature in its tissues, the cervical canal undisturbed, and the stump securely covered under the peritoneal folds, is not always accomplished and completed by the same routine. For instance, it might be most convenient to begin by first ligating on the right side. If not so, begin on the left. In another case it might be

<sup>1</sup> Ibid.



deemed best to grasp the ligaments, including the bloodvessels, with a clamp-forceps, sever the ligaments, amputate the cervix, and then place the ligatures, with the uterus out of the way. At another time it might be deemed best to ligate one broad ligament, sever it and amputate the cervix, and then grasp and sever the vessels and ligaments on the other side, thus completing the technique, again with the uterus out of the way. Each case should be managed by the steps which will best facilitate the conclusion of the operation as described.

*CASE I. Supravaginal hysterectomy for fibroid tumor complicating pregnancy and rendering labor impossible.*—Mrs. H., aged thirty-seven years, was married in February, 1891. Menstruation had become rather profuse during the two preceding years, but the patient considered herself in good health until five months after her marriage, when she began to experience pelvic pressure-symptoms. Her catamenia had been suppressed in June. About September 1st she was suddenly attacked with severe pain in the pelvis and along the course of the sciatic nerves. She also suffered severely from rectal and vesical tenesmus. I first saw the patient on September 28th. She was then extremely anæmic and appeared to be in great distress. The abdomen was distended by an irregular tumor which extended above the umbilicus. The tumor was in two parts, being larger on the right side and separated by a sort of hour-glass constriction. The mass on the right side was rather globular and conveyed a boggy, semi-fluctuating sensation, while that on the left was quite firm, at one point having a projection of almost bony hardness. Vaginal examination revealed the pelvis to be occupied by a firm, hard mass larger than a child's head. It entirely filled the pelvic cavity and was immovably fixed. The cervix uteri could not at first be found, but it was finally located above the transverse ramus of the pubic bone and almost out of reach of the finger, where it was flattened between the bone and the tumor. By combined palpation the globular mass on the right side was shown to be continuous with the cervix. The usual mammary changes of pregnancy at the fifth month were present, and there was a well-marked uterine bruit. The diagnosis of fibroid tumor complicating pregnancy and rendering labor impossible was established.

The great suffering and danger of the patient made it imperative that steps should be at once taken for her relief, and she was transferred to the Polyclinic Hospital on the next day, September 29th.

*Operation October 2, 1891:* After anæsthesia I endeavored to dislodge the tumor and elevate it into the abdominal cavity, with the hope that the pregnancy might go to term, but failed, and therefore decided to open the abdomen. I began by making an incision three inches in length, when the pregnant uterus was exposed to view. The organ was above and resting on the right side of the tumor, being connected with the latter by a pedicle about an inch in diameter. The left broad ligament and the tube and ovary were stretched over the tumor. Passing my hand beneath the uterus and over the pelvic mass, I found the latter very firmly fixed in the pelvis, not, however, by inflammatory adhesions. The incision was now slightly increased, when the uterus emerged from the abdominal cavity. The tumor was then dislodged after great effort and rotatory movement. The propriety of removing the tumor and

leaving the pregnant uterus was now considered, but further examination showed that the organ contained another tumor imbedded in its wall; there were also several malignant-looking white protuberances on its surface. I therefore determined upon hysterectomy. The operation was concluded by the technique described, although the different steps were not carried out in the same order, for it was during this operation that the method was evolved. In this case the peritoneal folds were secured by a row of Lembert sutures. The patient made an uninterrupted recovery, being apparently convalescent from the beginning. I examined this patient four years after the operation and found her in perfect health.

CASE II. *Supravaginal hysterectomy for impossible labor in a woman who had been delivered by the Cæsarean section eighteen months previously.*—Mrs. E. H., aged twenty-seven years, entered the Polyclinic Hospital by direction of my colleague, Dr. E. P. Davis, on January 14, 1894, in labor. The patient had been examined some time previously by Dr. Davis, when it was determined that the successful delivery of her child would be impossible without operative aid.

"Examination of her pelvis at this time gave the following measurements:

|                                    | Cubic centimetres. |
|------------------------------------|--------------------|
| Anterior superior spines . . . . . | 28                 |
| Crests . . . . .                   | 30                 |
| Trochanters . . . . .              | 29.5               |
| External conjugate . . . . .       | 19.5               |

"Vaginal examination showed the rami of the pubis approximating each other more closely than normal. Palpation of the inner surface revealed a funnel-shaped pelvis, the cavity narrowing very appreciably toward the outlet. In comparison with the breadth of the patient's shoulders and the width of the iliac bones, it was seen that she had a flattened and converging pelvis."

"This was her sixth pregnancy. Her first, third, fourth, and fifth labors had been terminated by the use of the forceps, each labor resulting in the birth of a dead child. All of these stillborn children were large, weighing over twelve pounds. The second pregnancy resulted in the spontaneous delivery of a living male child, after a very severe labor, but this child happened to be quite small."

Some hours after her admission Dr. Davis kindly requested me to see the patient in consultation with him and Dr. R. P. Harris. The question of symphysiotomy *versus* Cæsarean section had been discussed before my arrival, and for reasons stated by Dr. Davis, in his report of the case, the latter operation was favored. Dr. Harris at first favored symphysiotomy, but the apparently large size of the child and the diagnosis of breech presentation, together with the peculiarly deformed pelvis, caused him to change his view. I very readily concurred in the wisdom of this choice and had the pleasure of aiding in the operation, which was immediately undertaken. The child, a female, weighed about twelve pounds. The patient and child both did well.

A year later Mrs. H. feared that she was again pregnant, and examination revealed that she was about three months advanced. She was urged to keep herself under observation so that premature labor might be induced at the proper time, should it be deemed advisable. The relative risks of this operation, in view of the recent Cæsarean section, were explained to her.

She did not favor the premature labor, largely because of the greater danger to the child, and for the additional reason that she wished to be protected from the risk of future pregnancy should it be again necessary to make abdominal section. She did not again report until near the full term, when she was transferred to my care. She entered the Polyclinic Hospital on July 9, 1895, a week before full term. The abdomen was greatly distended and the child was evidently large. The breech appeared to be in the right iliac fossa, and the heart-sounds were best heard about three inches above and to the right of the umbilicus. The uterine bruit was heard most distinctly over the anterior surface. The examination of the pelvis agreed with that already given. It appeared to be a shallow funnel, the greatest contraction being at the outlet.

Both the patient and her husband were urgent in their request that measures should be taken to save the patient from the danger of future pregnancy.

She was accordingly placed in preparation, and on July 16th, late in the afternoon, signs of approaching labor were manifest. I was telegraphed for, having gone out of town for the evening, and at eight o'clock the operation was begun. I was ably assisted by Drs. Erck, Wells, and Gans. Incision through the old cicatrix exposed the uterus; the organ was then slightly tilted so that the right cornua could emerge, when the remainder was easily delivered. Dr. Wells now controlled the circulation by encircling the broad ligaments and cervix with the left hand. The uterus was then incised, the membranes ruptured, and the child delivered by the breech, which was found in the right iliac fossa. The cord twice encircled the child's neck, but it was not in the least asphyxiated and began to cry almost before it was out of the uterus. The placenta was attached to the anterior wall, in the identical position which it occupied in the previous pregnancy, when the Cæsarean section was performed. By the time the child, placenta, and membranes were delivered the uterus was firmly contracted, and remained so during the hysterectomy, which was concluded by the technique just described. The patient withstood the operation without the slightest evidence of shock and her recovery was as easy as after a normal labor. The child weighed about twelve pounds. She has nursed the child continuously since the operation. It is now seven months of age, and continues robust.

## SUPRAVAGINAL HYSTERECTOMY FOR IMPOSSIBLE LABOR, WITH INTRAPELVIC TREATMENT OF THE STUMP.

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### II. CHOICE OF THE OPERATION.

OBSTETRIC surgery is the natural outgrowth of the application of improvement in surgical methods and knowledge of antiseptics to obstetric practice. The result is seen in the saving of infant life and in the preservation, not only of the mother's life, but also of her health and vigor.



Difficult extraction of the foetus by the use of forceps, with mutilation of the mother and subsequent death of the child, may be avoided by the application to obstetrics of modern surgery. The term Cæsarean section has become indefinite because improved methods of operation in some instances supersede the simple and ancient procedure commonly known as Cæsarean section. At the present day, in cases where natural birth is impossible by reason of disproportion in size between mother and child, the obstetrician has the choice of symphyseotomy, cœlio-hysterotomy, or cœlio-hysterectomy. In the last of these he must discriminate between cœlio-hysterectomy with the extrapelvic treatment of the stump, and cœlio-hysterectomy with the intrapelvic management of the stump.

The field of symphyseotomy, although undoubtedly a legitimate one, is limited not only by the degree of disproportion between mother and child, but also by the size and development of the soft portions of the birth-canal. Experience has shown that symphyseotomy with extraction of the child through a small and ill-developed vagina is attended with greater risk than delivery by abdominal incision. Cases in which the foetus is in breech presentation are again less favorable for symphyseotomy than are presentations of the vertex. When, however, the degree of disproportion is but moderate and the birth-canal is fully developed, symphyseotomy will save the lives of many children with a minimum risk to the mother.

In selecting delivery by abdominal incision, the operator must choose first between cœlio-hysterotomy and cœlio-hysterectomy. By the former we understand incision of the uterus and extraction of the child, with suture of the uterus, leaving the patient capable of further procreation. By cœlio-hysterectomy is described the removal of the greater portion of the womb, rendering further childbearing impossible. In making this important choice, the wishes of the patient must be consulted. In women of good constitution and happily married few will be found who will not desire to retain their power of reproduction. On the other hand, in married women of feeble strength in circumstances of poverty the burden of childbearing may well be removed. In women illegitimately pregnant and belonging to the class of professional paupers, who are likely to be with their progeny a constant burden on the State, the continuance of reproduction is certainly to be avoided. Most of the latter class have little conception of the responsibilities of maternity, and even if asked to make a choice are incapable of doing so intelligently.

Between cœlio-hysterectomy with intra- and extrapelvic treatment of the stump the difference is great. Improvement in the technique of hysterectomy now enables us to remove the greater portion of the uterus with tubes and ovaries without excessive risk to the mother, and leaving her in a condition favorable for comfortable health. In view of these facts cœlio-hysterectomy with extrapelvic treatment of the

stump is rarely indicated. In cases in which the patient's condition is such that rapidity of operating is of vital importance it must be remembered that celio-hysterectomy with extrapelvic treatment of the stump is quickest. The simplicity of this procedure will also render it available for those who have had little experience in obstetric surgery. These advantages are more than counterbalanced by risks of infection owing to the position of the stump, by imperfect control of hemorrhage in many cases, and by tardy convalescence with subsequent interference with the functions of the bladder by the remnant of the uterus left behind. In cases in which abdominal delivery is necessary and future pregnancy is to be avoided celio-hysterectomy with intrapelvic treatment of the stump is at present the most desirable form of operation. To illustrate the propositions advanced the following cases are cited :

CASE I. Reported in full before the Academy of Medicine, New York, Section on Obstetrics, April 25, 1895.—The patient is a young colored woman, small and ill-developed, whose height is four feet eight inches, and whose pelvic measurements are as follows :

|                              |                   |
|------------------------------|-------------------|
| Iliac spines . . . . .       | 23 cm.            |
| “ crests . . . . .           | 24 “              |
| External conjugate . . . . . | 17 “              |
| True “ . . . . .             | 7 $\frac{3}{4}$ “ |
| Right diagonal . . . . .     | 21 “              |
| Left “ . . . . .             | 20 “              |
| Trochanters . . . . .        | 29 “              |

As disproportion between the head and the pelvis evidently existed labor was induced. After the patient had been in labor twenty-seven hours under good care in the Maternity Pavilion of the Philadelphia Hospital, it was determined to deliver her by abdominal section, because the head had entirely failed to enter the brim of the pelvis. The small size and ill-developed condition of her birth-canal rendered the indications for symphyseotomy not of the most favorable. The patient was without friends, with a family history of tubercular infection, and it was accordingly decided, in view of her illegitimate pregnancy, to make subsequent impregnation impossible. Celio-hysterectomy was accordingly performed, the stump being ligated and dropped. With the exception of rapid pulse during the first week of the puerperal period, the mother's recovery was uneventful. The patient nursed her own child, and assisted in nourishing another. She is at present (ten months after the operation) in good health and still nursing her infant.

CASE II.—M. H., aged twenty-three years, was sent to the Jefferson Maternity, May 8, 1895, by Dr. Jennings, of Merchantville, N. J., who measured her, and informed her that her labor would very probably require an operation. Her family history was that of tuberculosis and heart-disease. With the exception of rheumatism, the patient's health had been good. She had a miscarriage at seven months. She was in labor at this time for three days, and was finally delivered, the child dying soon afterward. She was then informed that further pregnancies would be exceedingly dangerous. Upon admission the patient was fairly nourished. An examination of her urine showed that her excretions were fairly well performed. The head of the fetus was found freely

movable above the brim of the pelvis, the back was to the right, the limbs toward the left and front. The foetal heart-sounds and position of the foetus indicated a second position, the occiput pointing posteriorly. The pelvic measurements were:

|                                                     |         |
|-----------------------------------------------------|---------|
| Iliac spines . . . . .                              | 23½ cm. |
| " crests . . . . .                                  | 26 "    |
| Right diagonal . . . . .                            | 20 "    |
| Left " . . . . .                                    | 20.5 "  |
| Trochanters . . . . .                               | 30 "    |
| External conjugate . . . . .                        | 17 "    |
| Vaginal measurement of the internal conjugate given | 10 "    |

The patient had completed nine months' gestation and was within a few days of term. In view of the evident disproportion between mother and child it was thought best to induce labor with the hope that the patient could be delivered by forceps. Bougies were employed under antiseptic precautions, and severe labor-pains with slow dilatation followed. When dilatation became complete the pains were very strong. The head, however, failed entirely to enter the pelvic brim. The resident physician, Dr. L. F. Hess, wisely refrained from rupturing the membranes, and to his good judgment is largely owing the life of the child. In view of the failure of induced labor to bring the head of the child into the brim of the pelvis, I decided to deliver the patient by abdominal section. She was accordingly etherized, the abdomen opened, the uterus incised, and the child and placenta rapidly delivered. The hemorrhage was controlled by the hands of my assistant, Dr. Coles. The child was slightly asphyxiated, but readily resuscitated by Dr. Wells. The patient was then placed in the Trendelenburg posture. A hysterectomy-clamp was applied across the uterus at the lower end of the incision into the womb, and the ovarian and uterine arteries and the broad ligaments were ligated at leisure. The uterus was then resected at the junction of the upper and lower uterine segments. The stump was closed by bringing together the peritoneal flaps and including the subperitoneal tissue with continuous silk sutures. The pelvis was sponged clean, the stump dropped, and the abdomen closed without drainage. The patient's convalescence was uninterrupted. Her temperature was but on one occasion above 100°, and then for a short time at 100.5°. Lactation was performed and the child properly nourished. At the present time the mother is in good health. The stump of the uterus is freely movable and she is still nursing her child. Examination of the fetus showed the presence of a rachitic skull, whose diameters were as follows:

|                                            |               |
|--------------------------------------------|---------------|
| Maximum . . . . .                          | 14.5 cm.      |
| Occipito-frontal . . . . .                 | 14 "          |
| " -mental . . . . .                        | 13.5 "        |
| Suboccipital bregmatic . . . . .           | 12 "          |
| Bitemporal . . . . .                       | 8.5 "         |
| Bimastoid . . . . .                        | 9 "           |
| Biparietal . . . . .                       | 10¼ "         |
| Trachelo-bregmatic . . . . .               | 12 "          |
| Circumference occipito-frontal . . . . .   | 33 "          |
| " maximum . . . . .                        | 34 "          |
| Bisacromial measurement of trunk . . . . . | 13 "          |
| Length . . . . .                           | 47 "          |
| Weight . . . . .                           | 4 lbs. 14 oz. |



The child has progressed favorably, having gained in weight, and when recently examined mother and child were in good condition.

CASE III.—The patient, a colored girl, aged about twenty years, applied during November, 1895, to the Polyclinic Hospital for attendance in confinement. Her pelvic measurements were as follows:

|                                    |            |
|------------------------------------|------------|
| Anterior superior spines . . . . . | 25 cm.     |
| Crests . . . . .                   | 26 "       |
| Trochanters . . . . .              | 29 "       |
| Right oblique diameter . . . . .   | 21 "       |
| Left " " . . . . .                 | 22 "       |
| External conjugate. . . . .        | 17 " plus. |

She had then completed the eighth month of gestation, the fœtus being in the usual position, the vertex presenting. Fœtal heart-sounds were heard upon the left side of the abdomen, but less distinctly than normal, although fœtal movements were vigorous.

Upon examining the patient's urine it was found that she was excreting imperfectly, and that she was threatened with toxæmia. She was accordingly given appropriate treatment for this condition. Two weeks after her first coming to the hospital she was taken apparently with labor-pains; examination, however, revealed the fact that the fœtus did not engage, that the membranes were unruptured, and that her pains were not of a violent nature. She was found to be constipated, and was accordingly treated by purgatives and sedatives, when her pains ceased. As she was not under intelligent care at home, she was admitted to the Polyclinic Hospital that an intelligent study of her case might be made. On admission, it was found impossible to bring the head of the fœtus to engage in the pelvis. For this reason labor was not induced, as the disproportion between the head and the pelvis was so great that the induction of labor was not considered justifiable. The patient was given a warm bath daily, the action of the bowels was attended to, and she was kept under observation. She began to have labor-pains on December 15th, although they were not strong, nor did they increase in frequency or strength. As the head entirely failed to engage, dilatation was very slight, and the membranes pressed but very little against the mouth of the womb. It was evident on December 16th that spontaneous labor would not proceed, and that the patient must be delivered by some operative procedure. The vulva and vagina were small and ill-developed, and in view of the small size of the pelvis and of the birth-canal symphyseotomy was declined. It was ascertained that the patient had been leading an irregular life, and that she was without known friends. In view of all the circumstances in the case, it was thought best to deliver her by cœlio-hysterectomy. On December 17th, after suitable antiseptic preparation, with the assistance of Dr. Wells, Dr. Coles, and the resident staff, the patient was placed in the Trendelenburg posture, the bladder emptied by catheter, and the abdomen incised. The abdominal wall was very thin, and the sharp scalpel employed not only opened the abdomen but also made a small incision in the peritoneal coat of the uterus. This was followed by free bleeding, which necessitated the rapid completion of the abdominal incision, the turning out of the uterus, and the prompt delivery of the child. Upon opening the uterus the placenta was found directly beneath the line of incision, and it was observed that the first incision into the uterus, made when the abdomen was opened, had opened a sinus directly over

the placenta; this explained the bleeding, which, however, lasted but for a moment. The child was readily extracted, cried vigorously, and breathed naturally. The time occupied in opening the abdomen and extracting the child was two and one-quarter minutes. The uterus was then clamped by hysterectomy-forceps, the ovarian and uterine arteries ligated, and the uterus amputated at the juncture of the lower uterine segment with the upper contractile portion of the womb. The stump was closed by continuous silk sutures, and the peritoneal edges brought into approximation. There was no hemorrhage, and drainage was not employed. The peritoneum and fascia were then closed by a continuous fine silk suture, and the muscular wall of the abdomen brought together by silkworm-gut. An antiseptic dressing was applied, and kept in place by long strips of adhesive plaster and a flannel binder.

The after-history of the case was uneventful. The patient's highest temperature was  $101^{\circ}$  for a short time, her average temperature ranging from  $99^{\circ}$  to  $100^{\circ}$ . She nurses her child, which has grown naturally. The first dressing was removed sixteen days after the operation, when the stitches were taken out. It was found that the deeper tissues had closed by first intention, and that a few points in the edges of the skin were not in accurate approximation and were closing by granulation. Examination of the child showed it to be at full term, its head well ossified, and slightly larger than the normal skull. It is a male, and has increased in weight in the normal manner. The mother's supply of milk continues abundant.

The after-treatment of these cases, with the mode of dressing employed, is of importance. As the abdomen is closed without drainage, the operator does not expect to interfere with the wound until union has rendered the stitches unnecessary. But one dressing is needed for two weeks after the operation, and that should be the one first employed. After the sutures have been inserted the line of incision should be freely powdered with iodoform or with boracic acid and iodoform, and a thick dressing of antiseptic gauze and cotton placed upon the abdomen. This dressing should be kept in place by strips of adhesive plaster extending entirely over the dressing and upon the patient's thighs and sides. It is better in these patients to dispense with the tapes often employed, which are usually tied over the line of incision. As the incision is a long one, reaching above the umbilicus, it is essential that the patient's abdomen be kept as quiet as possible; hence the value of the adhesive strips which are not readily displaced. Over these strips an ordinary many-tailed bandage of flannel may be applied. In view of the length of the incision, it is well to leave the sutures in place as long as possible. They may remain to advantage for two weeks, at the end of which time the first dressing is made and the sutures are removed. The general care of the patient is that of any puerperal case. The intestines should be emptied within forty-eight hours after the operation, preferably by small doses of calomel, followed by rectal injection of salts and glycerin or of castor oil and turpentine. In other respects the patient's care should be

that of the normal lying-in woman. She should remain upon her back for three weeks before attempting to sit up, and should not stand or walk for four weeks at least after the operation. An abdominal bandage will often be a source of comfort to the patient, although, if union has been good, it is not a necessity.

I desire to call attention to the early history of Mrs. E. H., a patient operated upon at my request by my colleague, Dr. Baer. She has a funnel-shaped and flattened pelvis, whose diameters are as follows:

|                                    |        |
|------------------------------------|--------|
| Anterior superior spines . . . . . | 28 cm. |
| Crests . . . . .                   | 30 "   |
| Trochanters . . . . .              | 29½ "  |
| External conjugate. . . . .        | 19½ "  |

Palpation of the inner surface of the pelvis reveals marked narrowing toward the outlet. In comparison with the breadth of the patient's shoulders and the width of the iliac bones, it is also found that she has a flattened pelvis. She has been pregnant seven times, her first, third, fourth, and fifth labors being terminated by the use of forceps, with the birth of a dead child. All of these children weighed more than twelve pounds, the first thirteen and one-half. Her second labor terminated spontaneously, a small male child being born, although her medical attendant had sent for assistance to perform an instrumental delivery. This patient came under my observation in January, 1894, desiring the delivery of a living child. Her foetus was in breech presentation, and evidently a large one. She was delivered by me at the Polyclinic by cœlio-hysterotomy, Dr. Baer being present in consultation. The uterus was sutured, and the abdomen closed without drainage. She made an excellent recovery. Her child weighed eleven and three-quarters pounds, and was 52 cm. long; it is living and in excellent health. As the patient is a respectable married woman, her husband living, and as she expressed no wish to avoid further conception, I performed cœlio-hysterotomy as described. Early in 1895 she wrote me that she was pregnant again, and feared greatly the result of her pregnancy. I at once informed her that she could be delivered of a living child, probably without a serious operation, by coming to me in time for the induction of labor. She came to my office early in her pregnancy and was evidently in excellent condition. Her pregnancy was uneventful; she suffered some abdominal pain during the early months, which seemed to be due to possible adhesions between the uterus and peritoneum. This disappeared, however, and she remained in good health. She presented herself at the Jefferson Maternity near the end of her gestation, long after the period assigned for the induction of labor. In my absence from the city, I requested Dr. Baer kindly to take care of the patient. It was her expressed desire that this pregnancy should be her last. This case illustrates, I think, the choice of operation, and the fact that



with patients who are not always obedient to the physician's instructions it will not do to depend upon the induction of labor unless the patient co-operates loyally with the desires of the physician. When asked why she did not return for the induction of labor, she gave her fear of that method of delivery as the reason.

In conclusion, stress must be laid upon the great difficulty which the conscientious obstetrician will experience in choosing the form of delivery most likely to preserve the lives of mother and child. So remarkable are spontaneous births in abnormal cases that the physician must always give nature a chance to accomplish delivery. His attitude, however, must be that of one who delays watchfully and intelligently, and not with neglect. As stated in Cases I. and II., the induction of labor under antiseptic precautions should first be practised when full viability has been attained. In many cases spontaneous birth follows, or at most version or forceps will complete the labor. When, however, it is clearly evident that the fœtus cannot pass through the birth-canal without such injury to mother and child as will jeopardize the lives and health of both, it is the part of wisdom to choose that form of surgical delivery most suited to the condition and development of the mother. Where the child cannot enter the birth-canal the use of forceps is certainly contraindicated, and delivery must be accomplished by symphyseotomy or abdominal incision.

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#### BULLET-WOUNDS OF PERITONEAL CAVITY AND CONTAINED VISCERA.

By L. M. TIFFANY, M.D.,

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THE following four cases of abdominal section for penetrating gunshot-wounds of the peritoneal cavity have come into my care. One has been reported already, and is referred to here in order that the series may represent all my work in this direction:

CASE I.—W. B., aged thirty years, a strong, well developed man, received a pistol-wound in the right side between the ribs and ileum, the supposed direction of the bullet being across the body, at 4.15 P.M. Sunday, December 2, 1888. He came to University Hospital, and I saw him about 9 P.M. At that time there was no symptom indicating a wound of the abdominal viscera; respiration was normal, the pulse somewhat accelerated, for he had been drinking; abdomen soft. The abdomen was opened by an incision in the linea alba about six inches long, partly below and partly above the navel; operation, 10.30 P.M. There was some blood in the abdominal cavity; five wounds of the small intestine were found and closed by the continuous Lembert

suture; the bullet was recognized within the small intestine near a portion of the bowel which showed a wound. The ileum and lower jejunum were the parts wounded. The abdominal cavity was flushed with boiled water until clean and the incision closed with silk sutures, a drainage-tube being left at the lower angle of the wound. A voluminous dry dressing was applied. During the night the patient tore off the bandages and walked about the ward with the wound uncovered; he was drunk at the time. He was redressed and put back to bed. In the morning it was found that he had again torn off all dressings, and the wound was open and exposed. The following day his temperature varied from  $99^{\circ}$  to  $100^{\circ}$ ; there was abdominal distention, yet but little pain was complained of; he took small doses of calomel and opium; no stool that day; urine normal. Next day, December 3d, his temperature was normal, his pulse 90, respiration 22, decided distention of the abdomen, the patient comfortable otherwise.

4th. Some vomiting of greenish watery fluid; during the day increased abdominal distention; symptoms of septic peritonitis were plain; little or no discharge from the drainage-tube, which was removed.

5th. Less green vomiting, distention continued, subnormal temperature, no pain. Fecal odor from the wound in the right side was noted, with slight discharge.

6th. No vomiting, an enema producing two stools, no pain, less distention, fecal discharges from the wound in the right side, subnormal temperature.

7th. Vomiting returned, no pain, no distention, temperature  $96.5^{\circ}$ , one watery stool, great restlessness.

8th. Restlessness continued, temperature normal, pulse 94, respiration 18, no pain, green vomiting.

9th. Vomiting, pain, great restlessness and anxiety, temperature  $99^{\circ}$ , marked prostration, much sweating, three watery stools during the day, temperature slowly rising. This condition of affairs continued, and he died at 9.05 A.M., December 10th. During the night rectal temperature showed  $102.5^{\circ}$ , pulse 104, respiration 22. Post-mortem examination disclosed peritonitis in the pelvis and around the track of the drainage-tube, no peritonitis above the navel; the sutured wounds of the intestine healed, were smooth and shining and not adherent to surrounding parts; the sutures appeared to be covered with exudate. The ascending colon showed two perforations close together, closed by lymph toward the peritoneal cavity, open toward the wound in the loin. A shred of cloth lay in the bullet track near the colon. The bullet was found in the small intestine. The cause of death was evidently peritonitis commencing at the seat of the drainage-tube. Whether such peritonitis would have taken place if the dressings had remained on or not it is impossible to say—probably, yes. The patient in the first twenty-four hours pulled off the dressings twice, being about the ward, as well as in bed, with the wound entirely uncovered. In closing the bullet-wounds the edges were brought together so that the scar was placed transversely in respect to the long diameter of the bowel. Distention of the gut did not, therefore, tend to separate the wound-edges or cause the sutures to tear out. So well was I satisfied with the behavior of the wounds when thus sutured, that I have followed the same method in subsequent cases.

CASE II.—William K., aged twenty-two years, white, male, was seen

by me with Dr. Tall, March 1, 1894. He had received a pistol wound while talking with a friend three hours before I saw him. The wound was to the right of the linea alba, about two inches and a half above the navel. The direction was said to be downward and toward the left. He was seen at his house; he rested on his side, was suffering much pain, and complained a good deal; he referred his pain to the abdomen generally, the walls of which were stiff and hard; pressure elicited much complaining. The surroundings not being favorable for the operation, he was sent to the University Hospital, and I operated as soon as preparations could be made. The abdomen was opened very freely in the middle line. I found eight perforations of the small intestine and four wounds of the mesentery. The former were closed by Lembert suture; vessels in two of the latter bled freely; they were ligated, but no attempt was made to suture the mesenteric wounds. Blood and feces were in the peritoneal cavity, which was freely flushed with boiled water until everything was clean. The patient was put to bed after operation, with a temperature of at most 95°, that being as low as the thermometer would mark. Food was withheld, cracked ice only being allowed the patient. By the following morning the temperature was normal. For the next three or four days cracked ice only was allowed to assuage thirst. Sutures were removed on the ninth day and some stitch-abscesses found. The convalescence which followed was interrupted on the twenty-second day after the injury by an acute attack of dysentery that lasted three days, but which yielded to treatment. The patient returned home well, with firm abdominal walls and no hernia, in May. He was directed to wear an abdominal support for at least one year.

CASE III.—“Gunshot-wound of the spleen and kidney, abdominal section, hemostasis by deep suture, recovery.” Read before the Southern Surgical and Gynecological Association, 1894. Published in the *Medical News*, 1894, vol. lxx., p. 546.

CASE IV.—Charles F., aged thirty-nine years, white, male, German immigrant, married (one child), good family history and of good habits, shoemaker by trade, came under my care at University Hospital.

On April 7, 1895, 2.30 A.M., he received a pistol-wound three inches from middle line and two inches below the margin of the right ribs. Dr. Spruill, resident physician, enlarged the opening, recognized that the bullet had entered the abdominal cavity, closed the wound with gauze lightly, and notified me. I saw him at 4 A.M. Decubitus dorsal. There was some dulness in the right flank. Before entering the hospital the patient was reported to have vomited, the nature of the vomit, however, could not be known; the presence of blood in the vomit was denied. Urine was found to be normal. There were no indications of wound of any abdominal organ. Shock was not marked; the abdominal walls were not unduly firm, and there was no tenderness on pressure. The belly was opened by an incision from the wound directly downward through the right rectus muscle, about seven inches long, the wound being parallel with the linea alba and two inches away from it. The epigastric artery was about parallel with the wound and was cut two or three times and ligated—of course, where cut. The right side of the abdomen contained clots and fluid blood, which were cleared away. The bullet had passed through the right lobe of the liver. There was bleeding from both upper and lower openings. The stomach showed two



openings where the bullet had evidently gone in and out. The wound of exit was under the spleen in the greater curvature of the stomach. The omentum showed evidence of injury, some blood being extravasated in it; the transverse and descending colons were lifted out and carefully examined. Except the injury to the omentum, nothing was seen; no wound of the small intestine was discovered; the bullet was not found; the wounds of the liver, both upper and lower, were tamponed with gauze, the ends of the same being brought out at the upper end of the abdominal incision. The holes in the stomach were closed with Lembert sutures, silk being used; the abdominal walls were brought together, save where the gauze from the liver was given exit. A voluminous dressing of gauze and cotton was applied and the patient put to bed. After passing from under the influence of the anæsthetic the patient showed signs of shock; the same day, five hours later, the temperature was  $97^{\circ}$ , pulse 92, and respiration 28; the same evening the pulse was 120, respiration 28, and temperature  $99\frac{3}{8}^{\circ}$ . Pain was complained of the same afternoon. Rochelle salt was given in teaspoonful doses every hour. With the first stool, which was after the second dose of salt, the patient passed the bullet. It became thus plain that the bullet had entered the descending colon beneath the spleen, where the omentum was wounded. Purgatives were withheld and morphia was given hypodermically, one-quarter grain every three hours. The temperature varied from  $101.5^{\circ}$  to  $99.5^{\circ}$  for five days. On the 12th the sutures were removed and the first outside dressing changed. The liver packing was not, however, disturbed. On the 13th the gauze was withdrawn from the liver-wounds, being soaked with bile. After this, bile flowed in large quantity into the dressings; the bowels became constipated and such stools as could be gotten, by enema or doses of Rochelle salt, were colorless. Five grains of ox-gall were given every two hours in compressed tablets. On the 14th and afterward enemata of sulphate of magnesia were made use of to empty the bowels. On the 18th phlebitis of the right lower extremity took place, but was not very marked. The dressings were changed twice daily and were filled with bile; the patient's complexion was mottled and his tongue dry. From the 21st to the 26th symptoms of consolidation at the base of the right lung were apparent. A firm yellow stool was passed April 23d; from May 1st well-formed yellow stools were passed daily; the amount of bile in the dressings gradually diminished from this time, until, finally, the abdominal wound healed, the patient's color returned, and he went out well June 19, 1895.

In the preceding cases it will be noticed, among other things, that twice the bullet lodged in the bowel, penetrating one wall and not going through the other—Cases I. and IV. In the other two cases the bullet was not found, lodging probably in the soft parts; no harm resulted from such lodgement. Had a large vessel been wounded, as an iliac artery or vein, evidence of the existence of such a wound would, of course, have called attention to the presence of the bullet. In the absence, therefore, of any symptom pointing directly to the lodgement of the bullet, after the intestinal wounds, etc., had been attended to, no further search was made for the bullet and no harm resulted. Save in

Case II. there were no symptoms when first seen indicating injury to the abdominal viscera. In Case II. there was some pain on pressure, and very marked rigidity of the abdominal muscles. There existed eight perforations of the small intestine. In this case it may be that extravasation from the bowel into the peritoneal cavity had to do with the amount of pain on pressure and rigidity of the abdominal muscle. No case showed blood, or feces, or gas making exit from the bullet-wound. Temperature, pulse, and respiration were unchanged. Indeed the most noticeable thing, when looked at after operation, was that there was nothing to indicate the amount of intraperitoneal lesion until the abdomen was freely opened; then, of course, everything became plain. This fact has been again and again referred to by writers, and is justified by the present series of cases. A surgeon who withholds operation until symptoms indicating the necessity therefor appear will withhold operation until it is too late, and the patient will have already passed, in many cases, beyond the path leading to recovery, for sepsis and peritoneal inflammation will have already started and made fatal progress. Conner, in *Dennis's Surgery*, vol. i. p. 454, quotes Redard as saying that a temperature of 96° Fahrenheit indicates very severe injury, and that an operation will not be followed by recovery. The cases here reported unquestionably show that with normal temperature a fatal injury (without operation) may be present, while after operation a subnormal temperature may be expected, 95° being recorded.

Hemorrhage from the liver, Case IV., which was free, was arrested by gauze-packing, and proved quite as effectual as deep sutures could have done, while it afforded an exit for the bile, which subsequently flowed in great quantity. It is to be noted that the gauze was not removed for nearly a week, by which time an excellent track of lymph had been formed from the liver to the abdominal wound, which was closed except at the top; hence the bile found easy exit from the body rather than into the peritoneal cavity, which route would have been followed had not gauze been used. This seems to justify the opinion that gauze-packing in liver-wounds is safer than suture. The mesenteric vessels were tied. As soon as the abdomen was opened and blood sponged away, blood from the mesenteric vessels spurted instead of oozed; whether this was due to the removal of the abdominal pressure by incision through the belly-walls, or as a result of sponging away the clots, it is difficult to say; but the fact remains that the oozing vessels became spurting vessels.

The splenic wound is sufficiently spoken of in the article quoted, and requires no mention here.

The absence of shock perhaps is as noticeable as anything else.

In the *Southern Surgical and Gynecological Transactions*, vol. vi. p. 183, the late Dr. A. B. Miles, of New Orleans, expresses "inability, by the

general symptoms, to recognize the extent of the traumatism within the peritoneal cavity. In a case with fourteen perforations of the small bowel the man had a pulse of 66, full and good, and we were attracted by the excellent condition of the patient on the operating-table; he did not appear to be shocked, and it was the observation of all present that the man's fair condition gave not the slightest indication of the gravity of the wounds within. . . . Again, some patients are so shocked by the occurrence in which they receive their injury that they seem extremely depressed by the result of simple accidents. At this moment I have in mind the case of a man brought into one of the surgical wards of the Charity Hospital with an external wound. He was lifted to bed absolutely helpless, and we thought he had a serious gunshot-wound of the abdomen. The man himself feared death was imminent. On examining his clothes we found the bullet in the leg of his drawers, showed it to him and told him to get up and go home, but he was unable to get out of bed for hours. So far as my individual experience goes, I have never been able to diagnose with precision the gravity of the conditions within the abdomen by the appearance of shock. Up to this date, November, 1893, I have operated on fifteen cases, and I have saved six patients. Among these, one man had sixteen wounds of the small intestine, one fourteen, one ten, and a woman had eight. These four cases surely would have died by the old plan of tentative treatment."

Cases I. and IV. are examples of unsutured gunshot-wounds of the large intestine, one recovering and the other dying, death not being the result of the wounded colon. In this latter, Case I., the patient died from infection at the seat of the drainage-tube, which may or may not have taken place had he permitted his bandages and dressings to remain in position; but it may be considered quite certain that it would have been much better to have left in no drainage-tube at all and to have closed up the whole abdominal wound, so that even if he had torn off the bandages there would not have been a free way into the peritoneal cavity for infection, as there was.

In the second case there may be some excuse for not discovering the colon-perforation. First of all, and most important, the man recovered. Secondly, the colon at the wounded place was withdrawn from the peritoneal cavity, laid on the belly-wall and carefully examined for the bullet-wound, which must have been at that part of the gut where attached to the omentum, yet it was not discovered. No wounds of the small intestine remained unsutured.

The rapidity with which the operation is to be done is, of course, a matter of importance; but speed is secondary to thoroughness, and a finished operation, even though slow, is superior to a rapid and incomplete one, for evident reasons. In the cases reported, after operation the temperature was extremely low, the patients being in condition of



profound shock, as would be natural after handling the bowels, withdrawing them from the peritoneal cavity, etc.

It was repeatedly noticed that flushing the open belly with hot water always produced a most excellent effect upon the pulse, which not only increased in volume and force, but diminished in rapidity.

In Cases III. and IV. the bullet-wound of entrance was enlarged, and it was recognized that the bullet had entered the peritoneal cavity. Had the same thing been done in Case I. good would have resulted, and the colon-wound would have been discovered. The wound of entrance should be explored by incision, and the subsequent treatment will be largely guided by the result of such examination. Median abdominal section gives the best access to the peritoneal cavity, and would seem preferable, unless there are indications to the contrary.

Food, after operation, was withheld, cracked ice only being given; in one case for eight days.

Purgation by salines is to be had recourse to, unless there is reason to suspect that an unclosed bowel-wound exists, when opium will be found more serviceable, should it be deemed not best to reopen the abdomen and search for the wounded bowel.

The following propositions seem to be justified:

1. A penetrating wound of the peritoneal cavity is not accompanied by symptoms commensurate with the extent of the injury.

2. Many fatal lesions may be present, yet give rise to no marked symptoms.

3. Fatal lesions may exist, yet shock be wanting.

4. The wound of entrance should be enlarged, and, if the missile have entered the abdomen, a section is called for.

5. Operation is proper soon after the injury, before the peritoneal membrane has become infected, or much blood lost.

6. Flushing the open peritoneal cavity with hot water or hot, normal salt-solution is an excellent stimulant to the heart.

7. The abdominal wound should be closed when practicable without drainage.

## A CONTRIBUTION TO OUR KNOWLEDGE OF ALBUMOSURIA.

By M. L. HARRIS, M.D.,

PROFESSOR OF SURGERY IN THE CHICAGO POLYCLINIC.

WHEN albumin was first discovered in the urine and correctly referred to a diseased kidney as its antecedent, a great advance was made in our means of diagnosis.

At first all albumins were considered alike, and to find albumin in the urine meant but one thing, namely, disease of the kidneys. More extensive observations soon demonstrated, however, that many conditions gave rise to albuminuria other than disease of the kidneys, and, furthermore, that there are several kinds of albuminoids or proteid bodies that may appear in the urine.

These proteid bodies we may divide into four classes:

1. Coagulable proteids, such as serum-albumin, globulin, fibrinogen, etc.
2. Nucleo-albumin.
3. Albumoses or proteoses.
4. Peptones.

It is only with the albumoses and peptones that we have to deal.

Owing to the great confusion and contradictions which exist in the literature of this subject, on account of a failure properly to recognize and differentiate these two classes of proteids, it will be necessary before proceeding further to define what we mean by albumose and peptone.

If a solution of a native protein, as egg-albumin or fibrin which has partly undergone digestion, be treated to saturation with pure ammonium sulphate at the boiling-point after the method of Kühne,<sup>1</sup> a heavy precipitate will occur. After cooling and filtering we obtain a perfectly clear filtrate, which we find, upon applying the biuret-test, still contains a proteid body.

It is to this end-proteid of digestion that Kühne has applied the term peptone, and the term peptone should be strictly limited to this particular proteid. If we now examine the precipitate which has collected on the filter, we shall find it composed of two portions, one, the remains of our native proteid which has not yet been acted upon by the digestive agent, and which has been coagulated and rendered insoluble, and the other which is readily soluble in water or dilute sodium chloride solution. To this soluble portion the name albumose or proteose is given.

It is not a single product, but several products which can be still further separated, and represents the various steps or stages which intervene between the native proteid and the end-proteid, peptone. There are probably almost innumerable albumoses varying slightly according

to the particular native albumin from which they are derived and the antecedents leading to their formation.

Since these substances have been found in the urine many tests have been proposed for their detection. Owing to the error of mistaking albumose for peptone some of these tests are incorrect, some are too complicated or require too much time for practical clinical use, while others are not delicate enough to detect it when present in only minute quantities.

The one characteristic of peptone is that it is not precipitated by complete saturation with ammonium sulphate; hence if the biuret-reaction shows in the clear filtrate of an ammonium sulphate saturated urine, peptone is certainly present, but in applying this test there are many difficulties. In the first place, the last traces of albumose are very difficult to precipitate from solution. According to Kühne, the solution must be rendered successively neutral, alkaline, and acid, with prolonged boiling after each change in reaction. This is time-consuming.

Then the coloring-matter of the urine interferes materially with the delicacy of the reaction, and the reaction fails altogether when peptone is present in only minute quantities.

The characteristic reactions of albumose as given by Munk<sup>2</sup> are:

1. Not precipitated by boiling.
2. The careful addition of cold nitric acid produces a precipitate which dissolves with a yellow color on boiling, to reappear again on cooling.
3. The addition of acetic acid and double the volume of concentrated salt-solution gives in the cold a cloudiness or precipitate which clears on boiling, to reappear on cooling.
4. The ferrocyanide-test produces a cloudiness or complete precipitation.
5. Precipitation on saturation with neutral ammonium sulphate.
6. The addition of tannic and acetic acids or phosphotungstic acid solution produces cloudiness or precipitate.
7. Biuret-reaction.

Of these reactions Nos. 4, 5, 6, and 7 likewise precipitate the ordinary albumins, and No. 7 reacts to peptone; consequently none of these is of value in differentiating albumose.

No. 1 is simply negative, while Nos. 2 and 3 are not sufficiently delicate and are valueless in the presence of other albumins.

Thus, while the above reactions are characteristic of albumose, none of them is applicable to the detection of small quantities in the urine.

The methods most commonly used in the detection of peptone (albumose) in urine are those of Hofmeister and Devoto, as described by v. Jaksch.<sup>3</sup>

Hofmeister's first method with acetic and phosphotungstic acids, as



he states, only holds good where the urine contains a considerable amount of peptone. Furthermore, other albumins must first be removed or excluded.

Hofmeister's second method, phosphotungstic and hydrochloric acids, washing with sulphuric acid, then with water, rendering alkaline with barium carbonate, heating from ten to fifteen minutes on a water-bath at the boiling-point, then applying the biuret-test, is not characteristic of peptone, albumose reacting as well. Albumins must first be precipitated with an iron salt, which likewise precipitates some of the albumoses.

The method is unreliable and altogether too long and complicated for practical clinical use.

Devoto's method as described by v. Jaksch is erroneous, as it is stated there that saturation with ammonium sulphate precipitates peptone and the peptone is searched for in the precipitate. Peptone, of course, would not be precipitated at all, and any reaction obtained would be due to albumose.

The method, however, is not delicate enough, and the coloring-matter of the urine interferes materially with its application.

Concerning Hofmeister's method Shore<sup>4</sup> says: "An excess of FeCl leads in the end to a colored fluid, which interferes with the biuret-reaction, while with too little the complete precipitation of the proteids is not secured. If the solution be too acid, the subsequent heating may lead to the formation of some peptone by the action of acids upon albumins and globulins. The solution, however, must be left acid, otherwise the proteids are not precipitated.

"Albumoses are not removed, and the complete removal of other proteids is not readily secured."

The other tests which have been recommended are either too complicated or not delicate and reliable enough for practical clinical use. Such was the state of the subject some two and a half years ago when I began investigating the question of so-called peptonuria, and, after many failures and much dissatisfaction, I gave up the older methods and endeavored to find some test more delicate and reliable that could be applied in practical clinical work.

After much investigation and experimentation I am able to present a method which is so simple that any one at all familiar with the most ordinary laboratory technique can apply it, and so delicate that one part of albumose or peptone in 50,000 parts of urine may be readily detected.

I agree with Stewart,<sup>5</sup> Posner,<sup>6</sup> and others, that normal urine always contains a minute trace of an albuminoid body (probably nucleo-albumin), and as this as well as other albumins, serum-albumin, globulins, etc., react to the agents here employed the urine must first be freed from

the last trace of all coagulable albuminoids before testing for albumose or peptone.

This is accomplished as follows:

To 20 c.cm. of (acid) urine\* in a test-tube are added six or eight drops of a saturated solution of salicyl sulphonic acid in distilled water, and 1 grm. of plumbium chloride. Shake well and boil about thirty seconds. Cool by shaking in running water from the cold-water tap.

Filter through ordinary clean, white filter-paper until the urine is clear. Now add a few drops of a clear, saturated solution of sodium sulphate in distilled water, in order to precipitate what lead is held in solution; raise to the boiling-point, and cool under the cold-water tap as before.

Filter again until clear. We should now have a perfectly clear urine, absolutely free from every trace of coagulable albuminoids, including nucleo-albumin, in which we may search for albumose or peptone. This clear filtrate is divided into three equal portions, and placed in test-tubes, one of which is kept for comparison, the other two for further analysis.

To one of these are now added three or four drops of a saturated solution of salicyl-sulpho-tungstate of sodium in distilled water.†

If albumose or peptone be present, a cloudiness will appear, varying in degree according to the amount of these proteids present.

As the amount of albumose present is often very minute, it may be necessary to compare the tube with the control-tube in order to detect the cloudiness.

The cloudiness disappears entirely on gently heating the test-tube, to reappear on cooling.

To the third tube the test is varied by allowing about 5 c.cm. of a dilute solution of the salicyl-sulpho-tungstate of sodium (made by adding about ten drops of the strong solution to 5 c.cm. of distilled water) to flow very gently down the side of the tube, so as to rest on the urine as a separate layer.

This should be very carefully done so the line of contact will be sharp and clear-cut, not diffuse. A cloudy line appears at the point of contact of the two liquids if albumose or peptone be present.

When the amount present is very small it may take two or three

\* The urine must be fresh. If it must stand several hours before it can be examined, it should be preserved from the growth of bacteria in it by the addition of some antiseptic, preferably a few drops of formalin, which will keep it several days, and does not interfere with subsequent tests.

† Salicyl-sulpho-tungstate of sodium is prepared as follows:

To a boiling saturated solution of tungstate of sodium in distilled water salicyl-sulphonic acid is gradually added, under constant stirring, until the solution no longer turns red litmus blue; or, in other words, until the alkaline tungstate of sodium is completely neutralized. Upon cooling the salicyl-sulpho-tungstate of sodium crystallizes. A solution is now made of this in cold, distilled water and filtered. A perfectly clear, colorless fluid results.

minutes for the line to develop, and shows best, the two liquids being clear, when held in front of a dark background.

As before stated, this test is extremely delicate, 1 part in 50,000 being readily detected; it is simple, and can be easily applied in fifteen to twenty minutes.

Owing to the delicacy of the reactions it is necessary that all test-tubes be absolutely clean and the test-solutions perfectly clear, otherwise a slight reaction may be easily overlooked.

The sodium sulphate solution must be added in slight excess in order to insure the precipitation of all lead, as any lead left in solution would be precipitated by the salicyl-sulpho-tungstate of sodium, and thus interfere with the test.

This would be easily recognized, as the cloudiness in that case would not disappear on heating, but become more marked.

The boiling during the application of the test, while not absolutely necessary, very materially facilitates the reactions and should always be done. The cooling, after boiling and before filtering, must never be omitted.

If these few simple points be carefully observed, no difficulties will be experienced in applying the test.

We now come to the second part of our subject, namely, the origin of these albumoses and the clinical significance of their presence in the urine.

The early writings on the subject of so-called peptonuria by Gerhard,<sup>7</sup> Senator,<sup>8</sup> Obermüller,<sup>9</sup> and others were made at a time when the knowledge of peptone was so imperfect that they have for us but a historical value.

Our first real knowledge of this subject dates from Hofmeister<sup>10</sup> and Maixner,<sup>11</sup> and the method of analysis described by Hofmeister is the one which has been most commonly employed up to the present time.

These observers found what they supposed to be peptone in the urine in many diseases in which pus-formation and pus-accumulation play the chief rôle.

The apparent connection between the presence of peptone in the urine and the formation of pus led Maixner to suppose that the peptone had its origin in the pus-accumulation.

This supposition was very much strengthened by Hofmeister, who found, upon examining pus by the same method he used in examining urine, that pus contained an unusually large percentage of peptone, and, furthermore, that the peptone was not in solution in the serum, but was held chemically or mechanically by the pus-cells themselves, and that pus-accumulations could only give up peptone to the blood and thus to the urine when pus-cells in large numbers were destroyed. These two authors thus considered peptonuria to be a symptom of the



destruction or breaking down of pus-cells. V. Jaksch<sup>12</sup> was the next to investigate the subject of peptonuria. He made a large number of examinations after the method of Hofmeister in 354 patients, and in only 76 of these was peptone present for a longer or shorter time. In all but 4 of these cases could the peptone be referred to an inflammatory process or a pus-accumulation. V. Jaksch agreed with Hofmeister that the pus-cells must be destroyed in order to set the peptone free, before it could appear in the urine, and that the amount of peptone in the urine goes hand in hand with the degree or rapidity of absorption of the exudate. This form of peptonuria was, therefore, called the pyogenic form. V. Jaksch found peptone in a patient suffering from scurvy, and as there was no pus present here he considered it due to the destruction of the white blood-cells in the bloodvessels, designating it the hæmatogenic form.

Maixner,<sup>13</sup> in a further communication, reported the finding of peptone in the urine of 12 cases of cancer of the stomach, and in 5 out of 9 cases of typhoid fever.

As he could not attribute the peptone in these cases to the presence of a pus-accumulation, he considered it due to changes in the mucous membrane of the stomach and intestine, thereby permitting the absorption of this product from the digestive tract, and, therefore, called it the enterogenic form.

About this time Fischl<sup>14</sup> called attention to the fact that peptonuria was an almost constant accompaniment of the puerperal state.

He found that before confinement and during the first twelve hours after delivery the urine was free from peptone; it began, however, to make its appearance during the second half of the first day, and during the second and third days was almost constantly found—twenty-four times out of twenty-five. On the fourth, fifth, and sixth days it was present thirty-seven times out of forty-four; from the seventh to the tenth day, in only a few of the cases; while after the tenth day it was very seldom present.

He considered the peptonuria due to the puerperal state and caused by the rapid absorption of albuminoids during involution of the uterus.

He reasoned, if the peptonuria was due to the absorption of albuminoids from the involuting uterus, it would not occur after Porro's operation. He, therefore, examined the urine in a case of Porro's operation, and found no peptone up to the sixth day. This he considered established his point, but the fallacy of his reasoning will be apparent. Fischl likewise examined the lochia, and found peptone in it at times, but did not think it had anything to do with the peptonuria, because he found peptone in the urine when he did not find any in the lochia.

Peptonuria was at one time thought to indicate the death of the fœtus in utero, but this was soon disproved.

Pocanowski<sup>15</sup> in an elaborate paper on this subject presented the following formidable list of diseases in which he, using the method of Hofmeister, found peptone in the urine:

Typhoid fever, intermittent fever, typhus fever, variola, scarlatina, mumps, miliary tuberculosis, erysipelas, acute, chronic and muscular rheumatism, phthisis pulmonalis, croupous pneumonia, chronic pneumonia, empyema, embolism from heart-disease, angina faucium, carcinoma of the œsophagus, stomach, rectum, liver and uterus, perityphlitis, catarrhal icterus, cirrhosis of the liver, parametritis, apoplexy, abscess, and post-traumatic ecchymoses.

A glance at this long list of diseases will show at once the fallacy of attempting to attribute peptonuria to the absorption of broken-down pus-cells from a pus-accumulation.

Up to this time, as will have been noticed, nearly all the investigators employed the method of Hofmeister in their examinations. The appearance, however, in 1886 of Kühne's<sup>16</sup> article on albumose and peptone threw an entirely new light on the subject.

By the use of ammonium sulphate, first proposed by Wenz, Kühne was able to differentiate true peptone from the albumoses, and as Hofmeister's method failed to do this, it became necessary to reinvestigate the entire subject of peptonuria by the method of Kühne.

Thompson<sup>17</sup> was one of the first to employ this method.

He examined the urine of women during pregnancy and after confinement by saturating it with ammonium sulphate and applying the biuret-test to the clear filtrate. While admitting that deuterio-albumose was not completely precipitated by this method, still he considered it proper to call any albuminoid which remained in the urine after saturation with ammonium sulphate and gave the biuret-reaction, as peptone. From his examinations he concluded:

1. That peptonuria is not characteristic of the pregnant state.
2. It is not a symptom of the death and maceration of the fœtus.
3. Peptonuria may occur after confinement, but is not constant. Stoffregen<sup>18</sup> precipitated with ammonium sulphate, and after concentrating the clear filtrate used the biuret-test or tannic acid.

In 16 cases of pregnancy, 5 puerperia, 10 of phthisis pulmonalis, 2 of typhoid fever, 2 of croupous pneumonia, 1 of sepsis, 3 of tuberculosis, 1 of inflammation of the knee-joint, 1 of peritonitis, 4 of empyema, 4 of carcinoma, 2 of pyosalpinx, he obtained a negative result in all, except one puerperal case, in which he found peptone on the second, third, and fourth days, which he attributed to a failure to saturate completely with the ammonium sulphate.

Le Soir<sup>19</sup> saturated with ammonium sulphate, boiled fifteen minutes, filtered, concentrated to one-tenth, decolorized with plumbium acetate, and then tested with the biuret and tannic acid.

In 4 cases of scarlatina, 2 of measles, 3 of diphtheria, 3 of pneumonia, 1 of pleurisy with effusion, 1 of perityphlitis, 1 of tubercular abscess of the hip, 1 of compression-myelitis, 1 of transverse myelitis, and 1 of tubercular meningitis, all gave a negative result. By the same method of examination he could find no peptone in fresh pus. In pus, however, which had been exposed to the air for ten to fourteen days he found peptone. He concluded, therefore, that the urine might contain peptone in cases in which a pus-cavity had been long exposed to the air.

If now we compare the results obtained by Hofmeister's method with those obtained by later methods, after Kühne had differentiated true peptone from the albumoses by the use of ammonium sulphate, we find that they do not at all agree.

In the same class of cases in which Hofmeister found peptone, no peptone whatever could be found by Kühne's method. In fact, repeated, careful examinations have shown that true peptone in the sense of Kühne has never as yet been found in the urine, and that the products heretofore considered peptones by Hofmeister and others were not peptones, but belong to the class albumose.

This means, as Noordan<sup>20</sup> says, not that all the earlier observations are erroneous and valueless, but that the term albumosuria must be substituted for the term peptonuria.

Furthermore, the entire subject must be re-investigated by more delicate and approved methods with this knowledge before us.

By my method herein described I have made many hundred examinations of urine in a great variety of diseases, and have found products corresponding to the class albumose or proteose in the following conditions:

All kinds of suppurative conditions, acute and chronic, such as pelvic abscesses, appendicular abscesses, peritonitis, suppurative lymphadenitis, subcutaneous suppuration, osteomyelitis, etc.; and in the following infective diseases which I have had an opportunity to examine:

Acute croupous pneumonia, *la grippe*, phthisis pulmonalis, diphtheria, typhoid fever, syphilis (one case secondary stage), and one case of septicaemia of unknown origin.

It will thus be seen that albumoses are found in the urine in a great variety of conditions, and this brings us to a consideration of the origin and clinical significance of this class of proteids.

When Hofmeister and Maixner found peptone (albumose) in the urine in so many conditions, accompanied by the formation and accumulation of pus in the body, and when Hofmeister stated that peptone was not contained in the pus-serum, but in the pus-cells themselves, it was concluded that the peptone arose from the disintegration of the pus-cells, when it was taken up by the blood and eliminated by the kidneys.



When v. Jaksch found peptone (albumose) in the urine in scurvy where there was no pus formation, he concluded it must be due to the rapid destruction of leucocytes in the blood.

When peptonuria was found in some cases of cancer of the stomach and in ulcerative conditions of the intestine it was considered that the peptone was absorbed unchanged by the denuded and ulcerated surfaces from the stomachic and intestinal contents during the process of digestion.

These forms were called respectively pyogenic, hematogenic, and enterogenic peptonuria.

The conditions in which peptonuria was found now began to increase quite rapidly, particularly in such conditions as were not accompanied by pus-formation, for instance, in scarlet fever, measles, and other infective diseases. Here the existing explanations were entirely inadequate. There was no disintegration of pus-cells, no rapid destruction of leucocytes, no denuded surface in the alimentary canal permitting the possible absorption of peptones during the process of digestion.

The normal blood and lymph contain no albumose or peptone.

These products formed in the alimentary canal during the process of digestion are re-converted into other forms of albumin in their passage through the epithelial cells of the intestinal mucosa, and are not to be found in the blood or lymph.

Hildebrandt's statement that peptone is taken up by the lymph-cells in the intestinal follicles has not been sustained, and Shore<sup>4</sup> has shown that neither the lymph nor the lymph-cells are capable of taking up or converting a particle of peptone or albumose, and that these substances when injected into the lymph-system can all be recovered from the urine.

Neumeister<sup>21</sup> says that albumose and peptone, when injected subcutaneously or directly into the blood, invariably act as foreign bodies, and are eliminated as quickly as possible, and, furthermore, that the entire amount injected may be recovered from the urine.

These facts show conclusively that albumose, when present in the blood and urine, is an abnormal constituent of new formation.

When we consider the various conditions giving rise to albumosuria there is one striking fact which is common to them all, namely: they are infective conditions due to the presence of known or unknown micro-organisms.

This fact impressed itself upon me early in my investigations, and I determined, if possible, to learn whether the various micro-organisms during their growth gave origin to or produced albumoses which might find their way into the blood, and thus appear in the urine.

It was first necessary to secure a culture-medium free from peptone and albumose.

The ordinary peptone of commerce is composed chiefly of albumoses, and as the usual culture-media are prepared with this they were unsuited to our purpose, as it would be impossible to determine what albumose had been artificially added, and what, if any, had been produced by the growth of the microbes. I finally struck upon hydrocele-fluid, which is rich in albuminoids, similar to the normal fluids of the body in which the micro-organisms grow when infection occurs. A supply of the fluid was obtained from my surgical clinic at the Polyclinic. It was drawn into sterile flasks, under aseptic precautions, and analyses of it showed it to be absolutely free from any trace of albumose or peptone. A number of test-tubes were prepared with the fluid, and several of them were inoculated, respectively, with pure cultures of *staphylococcus pyogenes aureus*, *streptococcus pyogenes*, and *bacillus coli communis*. A quantity of the fluid was likewise left exposed to the ordinary saprophytic organisms of the laboratory air.

Owing to the well-known slight germicidal action of fresh hydrocele-fluid it is necessary to inoculate quite freely in order to insure a growth, as a few organisms will be destroyed before growth takes place. Cultures of the three varieties of microbes inoculated were obtained, as well as of the unidentified saprophytes of the air. The contents of all tubes in which growth occurred were now carefully analyzed and albumose found in all of them without exception. As no albumose was found in control-tubes, nor in tubes in which no growth occurred, we must conclude that the albumose was produced directly by the growth of the micro-organisms. The albumose is not an excretion of the microbes, but is produced by the digestive action of the organisms upon the albuminoids (serum-albumin, globulins, fibrinogen, etc.), present in the fluid. Kühne<sup>22</sup> has likewise shown that albumose is due to the direct action of micro-organisms upon albumins. He found that tubercle-bacilli growing in an albuminous fluid produce albumose; but if no albumin be present in the culture-medium, no albumose whatever is formed. He has also shown that the hay-bacillus and *bacillus prodigiosus* are capable of converting proto-albumose into peptone. Hankin<sup>23</sup> found that the substance formed by the growth of anthrax-bacilli was a veritable albumose, while Sidney Martin,<sup>24</sup> by growing anthrax-bacilli in a pure solution of alkali-albuminate prepared from blood-serum, proved the formation of both primary and secondary albumoses as well as peptone and other cleavage-products.

Brieger and Fränkel<sup>25</sup> have obtained with the diphtheria-bacillus albumose-like bodies which were endowed with powerful poisonous properties. Chittenden<sup>26</sup> obtained albumoses, peptone, and crystalline bodies with the bacillus of glanders grown in alkali-albuminate. Robit-schek<sup>27</sup> found that typhoid bacilli produce peptone (albumose) when

cultivated in peritoneal fluid, and suggested the possibility of a bacterial peptonuria. Debraye and Legrain<sup>28</sup> state that urine containing albumin, if allowed to stand for some hours subject to the action of the ordinary saprophytic organisms of the air or the bacteria of the urethra, will show the presence of peptone (albumose), this being due to the action of the organisms on the albumin. The production of toxalbumins by the growth of different micro-organisms in various media has been studied by numerous other observers, and these toxalbumins have been found to correspond in their chemical reactions, etc., to the great class of proteoses or albumoses. Chittenden (*loc. cit.*) says "It is thus evident there is ample ground for the statement that all nutritive media in which pathogenic bacteria have been planted are liable to contain sooner or later toxic substances, many of which at least are closely related to if not identical with the albumoses."

Kühne has designated all of these peculiar albumoses of bacterial origin acroo-albumoses. They are endowed with marked chemical and physiological properties, causing a rise of temperature when injected into the blood, as well as other phenomena more or less pronounced. It is a well-known fact that before any organized body can assimilate or appropriate to the building up of its own structure albuminous matter, this must first be converted into more soluble forms. This process of conversion of albuminoids is called digestion. From our own experiments and those of numerous other observers herein mentioned, showing the power of micro-organisms to convert or digest albumins, and from the fact that from man down to the lowest form of animal life all possess this power of digesting albumin, we are justified in the conclusion that this digestive power, or, as it is sometimes called, peptonizing power, is one common to all forms of living organized bodies. The proteoses or albumoses are primary products, as Chittenden says, in the digestion of every form of proteid matter intermediate between the mother-proteid and the peptone, and that we have to deal not only with a number of bodies superficially unlike, as the primary and secondary proteoses or albumoses and peptones, but these bodies may show marked variations in structure dependent upon the exact conditions attending their formation.

The origin of the albumoses in the urine is now readily seen. Micro-organisms invading the body develop in the rich albuminous fluids and tissues. In order to be able to appropriate the albumins to their own growth they digest them, thus producing the various albumoses. Here, as in the higher forms of life, we find much larger quantities digested than are assimilated. The albumoses being very diffusible, as soon as formed the excess is readily taken up by the blood and eliminated by the kidneys, thus appearing in the urine. The digestive activity of the



different organisms varies considerably. At one time we find large quantities of albumose in the urine, again only the slightest trace. The amount of albumose present in the urine in any particular infection is to a certain extent an indication of the activity and severity of the disease. As, for instance, in a very severe case of typhoid fever in which death occurred at the end of the first week with symptoms of the most profound toxæmia, the urine contained relatively a large amount of albumose. The quantity obtained from about 20 c.cm. of the urine was filtered out, carefully washed with dilute sulphuric acid, redissolved in very slightly alkaline distilled water, and injected hypodermatically into a grown cat. In an hour the cat presented marked symptoms of intoxication, with elevation of temperature, from which, however, it recovered completely in a few hours. In typhoids running a milder course the quantity present is relatively less.

In regard to the clinical significance of albumosuria little additional need be said. As the albumose is due to the digestive action of invading microbes on the albumins of the fluids and tissues of the body, its presence in the urine simply indicates that we have to do with an infective condition in a state of more or less activity. A word or two, however, in regard to the question of so-called peptonuria and the presence of suppuration within the body.

The digestive or peptonizing power of the ordinary pus-microbes is usually quite active, and whenever suppuration is taking place anywhere within the body albumose is always present in the urine.

This albumosuria, however, can only be held indicative of suppuration when all other infective conditions can be excluded. The question may be stated thus: Given a patient with a probable circumscribed inflammatory condition, in which the infective diseases can be excluded, the presence of albumose in the urine is quite positive evidence that the condition is inflammatory and that suppuration has taken place.

I have by this means correctly diagnosticated suppuration many times, in conditions which were otherwise very doubtful and uncertain.

In closing, I desire to present the following conclusions as a result of this study:

1. True peptone being very rarely, if ever, found in the urine, the term peptonuria should be substituted by the term albumosuria.
2. The albumoses are produced by the digestive or peptonizing action of microbes on the albumins of the body.
3. This digestive action is one common to all forms of living organisms.
4. The albumoses are produced in quantities much in excess of what are appropriated by the microbes for their growth and development.
5. The albumoses being readily diffusible, the excess in production is

quickly absorbed by the blood, where, being toxic, and thus acting as foreign bodies, they are eliminated by the kidneys and appear in the urine.

6. Albumosuria may be present in any condition or disease due to the action of micro-organisms within the body, and is thus simply indicative of an infective condition.

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## REVIEWS.

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PÆDIATRICS. THE HYGIENIC AND MEDICAL TREATMENT OF CHILDREN.

By THOMAS MORGAN ROTCH, M.D., Professor of the Diseases of Children, Harvard University. Illustrated. Pp. 1124. Philadelphia: J. B. Lippincott Co., 1896.

At the end of the nineteenth century an author who presents to a literature-burdened profession a book of more than 1110 pages assumes a responsibility of considerable magnitude. If he be honest, he must convince himself that he has something to impart and that there exists a real need for something that he can supply. An opportunity is given to him in his preface to explain his convictions, and Dr. Rotch embraces this opportunity by saying:

"There has been no attempt to make such classifications as infectious and non-infectious diseases, because our knowledge of the former is increasing the number of that class so rapidly that for me it no longer constitutes a practical division for teaching. The book begins with a consideration of the infant at birth, and follows it through its various stages of development up to puberty. After dwelling rather more at length on normal development than is usual in works on pædiatrics, the abnormal conditions are discussed. Beginning with the diseases which would naturally be met with in the early periods of life, and devoting considerable space to my observations on the blood of infants and of young children, the diseases of the different organs are then considered.

"The establishment of milk-laboratories during the last three years has marked a new era in preventive medicine, and has made possible the scientific feeding of infants. As I believe that the medical treatment of the various abnormal conditions arising in infants is in the future to be largely dietetic rather than by means of drugs, I have given unusual prominence to the part of the work which is devoted to feeding.

"I have also endeavored, in conjunction with my colleagues in the American Pædiatric Society, to simplify the nomenclature of the various diseases, in order that physicians in different localities should by using identical names be the better able to aid one another in their investigations. A revision of the nomenclature of gastro-enteric diseases and of those of the mouth was especially called for on account of the changes which have followed our increasing knowledge of the etiology of these diseases."

Division I., on the Infant at Term; Division II., on Normal Development; and Division III., on the Hygiene of the Nursery, are excellent. Attention is especially called to the beautiful casts of the foetal heart and bloodvessels, and of the nasal cavity, made in fusible metal by Dr. S. J. Mixter; and also to the plate showing the color of napkins caused by normal and abnormal intestinal discharges.



Division IV. is devoted to feeding—the general principles underlying all methods of infant-feeding, maternal feeding, direct substitute-feeding, indirect substitute-feeding, comparison of woman's and cow's milk, milk-laboratories, and the home modification of milk. It covers 135 pages, and is not only the most important part of the book, but is without doubt the most valuable contribution to the subject of infant-feeding that has as yet appeared.

The lectures on the blood in infancy and childhood cover 75 pages, and represent many original and valuable observations. However, we think that the proper place for it should be in a separate monograph and not in a text-book for students. The space devoted to this subject is out of proportion to its value, and could be used to greater advantage.

Division XI., consisting of 175 pages, is devoted to nervous diseases. This is an inadequate allotment when one considers the number of nervous diseases that are discussed, and that the chapter includes the subject of convulsions and the myopathies. In the introduction to this part of the work the author remarks that "We are much more likely to meet with nervous phenomena of the most diverse varieties in children than in adults. . . . The nervous specialist who has not worked practically among children, studying them in all their various phases of excitement and rest, disease and health, may fail to grasp the special phase of nervous disease by which he is at times confronted."

We do not doubt that his classification of nervous diseases may serve to facilitate understanding of them by students, but we fail to comprehend why hypnotism, insolation, and arrested psychological development should be included under the functional diseases of probable central origin. The first is not a disease, but a condition which may be artificially produced; the pathology of the second has been written; while for the third it is not reasonable to contend that it exists without somatic foundation.

Meningitis is considered in some detail, and, notwithstanding published cases to the contrary, the author is not willing to concede that any cases of the tuberculous variety recover. He recommends that palliative measures alone be used in this disease, in spite of the fact that, among others, Dujardin-Beaumetz reported a case of tuberculous meningitis ending in recovery, and the diagnosis was confirmed by the presence of tubercles of the choroid; and Freyhau reports another case of recovery in which the diagnosis was confirmed by the presence of tubercle-bacilli in the fluid obtained by lumbar puncture. We believe that the operation of lumbar puncture as described by Quincke, of Kiel, both for diagnostic purposes in this disease and for diagnostic and therapeutic purposes in hydrocephalus, is an omission of importance.

The subject of cerebral abscess really merits more extensive consideration than can be given to it in something more than half a page; and encephalitis, especially the acute non-purulent form, which often goes to recovery and is mistaken for meningitis, has not received the consideration which the author is so capable of giving it.

We must express our disappointment on reading the pages devoted to the subject of idiocy. At the present day when the pathology of idiocy has been so thoroughly presented as it has been by Hammarberg, and after sufficient time has elapsed to judge the statistics of Lannelongue's operation, no mention whatsoever is made of these important facts.

The subject of mirror-writing is allowed nearly twice the space of

intracranial syphilis, and three times that given to cerebral abscess. The statement is made that "the actual pathology has not been determined," while we all know that the pathology has been as thoroughly written as it possibly can be, and that it may occur in perfectly normal children.

The course of acute anterior poliomyelitis is not chronic, although its sequelæ are; and we should expect some reference to the epidemic form of this disease after the important contributions of Medin and Caverly. Complete helplessness with mental impairment cannot be said to be characteristic of Friedreich's disease, when the first case presenting any mental impairment is yet to be put on record. The space devoted to Sensitive Spine might well be given to a discussion of chorea nutans (head-nodding), and this condition, if it exists, be perpetuated under its proper name—neurasthenia. In discussing tetany no mention is made of two symptoms which are considered almost pathognomonic, viz., Chevostek's and Trousseau's."

The chapter on Diphtheria is excellent as far as it goes, but twelve pages seem very little to devote to such an important subject, and the one page given to the discussion of the serum-treatment would be of no assistance to a student or a physician who needed much help.

The book is filled with instructive illustrations, and the press-work is excellent; and it seems unfortunate that the style should be so difficult and involved, and that such little care should have been given to the relative value of the subjects under discussion.

On the whole, the book contains many valuable monographs which will be of great value to the general practitioner and to the pædiatrist; but as a text-book for students we think that it is unsatisfactory.

D. B.

LEHRBUCH DER ALLGEMEINEN PATHOLOGIE UND DER PATHOLOGISCHEN ANATOMIE FÜR AERZTE UND STUDIRENDE. VON DR. ERNST ZIEGLER, Professor der Pathologischen Anatomie und der Allgemeinen Pathologie und der Universität Freiburg in Breisgau.

TEXT-BOOK OF GENERAL PATHOLOGY AND PATHOLOGICAL ANATOMY FOR PHYSICIANS AND STUDENTS. BY DR. ERNST ZIEGLER, Professor of Pathological Anatomy and General Pathology in the University of Freiburg in Breisgau. Eighth, newly revised, edition; 2 vols., 8vo., pp. xii. 746; xii. 1025. Jena: Gustav Fisher, 1895.

THERE is probably no more striking evidence of the rapid and continuous progress which is making in our knowledge of disease than is to be gleaned from a comparison of the successive editions of Ziegler's great work on *Pathology*, to the eighth edition of which it is now our agreeable duty to call the attention of the readers of the JOURNAL. Although not quite three years have elapsed since the appearance of the preceding edition, the book has undergone many and notable changes, which have brought about a very material increase in its size and in the number of its illustrations.

By far the most fundamental of these changes is foreshadowed in the altered title of the first volume, which from "General Pathological Anatomy and Pathogenesis" has now come to be "General Pathology,"

a far more inclusive term, and one implying a much broader discussion of the changes in the body resulting from and constituting disease than was possible when only the structural elements of disease were considered.

The magnitude of the task thus undertaken is apparent at the outset from Ziegler's conception of disease in general, which is defined as "life, whose manifestations depart in a measure from the norm" of health, for it will be observed that this wider conception of pathology involves a consideration not only of the changes in structure of the tissues and organs incident to disease, but of the perversions of function also which make up in a great degree its outward manifestation. We accordingly find in the present edition a very thorough revision of the opening chapters which deal with the underlying principles of disease, with its causation and chief general symptoms. But, though thus emphasizing the importance of a consideration of the disturbances of the function met with in disease, Ziegler would discard the idea of the existence of purely functional diseases, believing that material changes of some sort, physical or chemical, will sooner or later be found to underlie all perversions of function just as they are at the foundation of all the normal processes of life.

Aside from this broader treatment of the subject-matter of the first volume, the most considerable changes in this part of the work are met with in the chapters on the Causation of Disease, on Inflammation, and on the Parasites, including, of course, the bacteria.

The first of these, the section on the Causation of Disease, has been for the most part entirely rewritten and much elaborated. This is particularly apparent in the discussions of the effects of intoxications and infections, of metastasis, embolism, and thrombosis, and of the influence of disease of one organ upon the other organs of the body. In connection with the last of these an entirely new section has been introduced, treating of the diseases which recent investigations would show to be in great part, if not wholly, the result of the removal from the body of the functional product of some particular organ. These are cachexia thyreopriva, cretinism, myxœdema, Addison's disease, and some of the forms of diabetes mellitus.

Again, a much more extended treatment is observed in the chapters on Natural Immunity and Recovery from Disease; on Predisposition, both Inherited and Acquired; on Idiosyncrasy; and on the Induction of Immunity by Artificial Means, these subjects being considered not only in their relations to the origin and course of the disease, but also from the standpoint of their practical applications to medicine.

The section upon Inflammation has been entirely rewritten to bring it into conformity with the conception of the inflammatory process suggested by Ziegler about two years since, that it "is essentially a local tissue-degeneration combined with pathological exudations from the bloodvessels, with which tissue-growth is sooner or later associated as a regenerative or hypertrophic process." This conception brings together all the changes, whether destructive or constructive, which result from the action of any injurious agent, and makes more logically apparent than heretofore the close inter-relationship of the various phenomena of inflammation. To us the most noteworthy of the advantages derived from this change is the elimination of the anomalous class of "Granulationsgeschwülste," and the incorporation of tuberculosis, syphilis, rhino-



scleroma, etc., as special forms of inflammation, with the sections devoted to the consideration of the specific germs which are their cause. It has long been our contention that the separation of these processes in a group by themselves and their consideration as of an essentially different character from the inflammatory process were confusing and based upon an erroneous conception of their nature. Fundamentally their elements are the same as those of the simpler varieties of inflammatory reaction—degeneration, exudation, and tissue-hyperplasia—the particular combination of these elements in each case depending upon the peculiarities of its active etiological factor.

Additions are also noticeable in the chapters on Degeneration and Regeneration, on the Tumors, on the Malformations, and on the Parasites, the additions of the past few years to our knowledge of these subjects being everywhere incorporated. Indeed, it would be possible to notice briefly the present edition of Ziegler's work by the simple statement that it has undergone all the changes necessary to bring it consistently in line with the most recent advances in our knowledge of disease. A higher commendation is hardly possible.

In the second volume, devoted to the changes in the various organs incident to disease, to Special Pathological Anatomy, the same careful revision of all the chapters is observable, though here the changes made necessary by our advancing knowledge are less conspicuous.

The clear typography and abundance of excellent illustrations characteristic of the previous editions are preserved in the present, and the copious bibliographical lists scattered throughout the volumes include all the most important articles upon the various subjects treated of which have appeared up to the time of going to press, thus materially increasing the usefulness of the book as a work of reference.

J. S. E.

**SURGERY: A PRACTICAL TREATISE WITH SPECIAL REFERENCE TO TREATMENT.** By C. W. MANSELL MOULLIN, M.A., M.D. Oxon., Fellow of the Royal College of Surgeons, etc. Assisted by various writers on special subjects. Third American edition, revised and edited by JOHN B. HAMILTON, M.D., LL.D., Professor of the Principles of Surgery and Clinical Surgery, Rush Medical College. Philadelphia: P. Blakiston, Son & Co., 1895.

THE first American edition of this book was a reprint of the English edition. The second was revised and edited by Dr. Hamilton, the editor of the present edition. He omitted certain portions of Mr. Moullin's chapters on Diseases of the Skin, Eye, Ear, and Larynx, added a brief chapter on Military Surgery, and inserted various short notices in different parts of the volume. The third American edition does not differ very much from the second. Both are founded on the American reprint of the English edition of 1891.

Moullin's *Surgery* contains a very great deal of valuable information; and is often referred to by the reviewer, because of its encyclopædic character. It has always, however, been aggravating because of its want of clearness in diction and its faulty style. The reader who is familiar with surgery can usually understand the author; but the student

or inexperienced practitioner, who refers to it, will often be greatly disappointed because of his inability to know exactly what are the facts which the author desires to teach him.

This criticism applies particularly to the sections on Surgical Pathology. These contain the essential facts of bacteriology and microscopy, known at the time the book was written, which are requisite for the understanding of surgical diseases and injuries. The text, however, is so involved and so obscure that it tempts one to believe that the author himself did not clearly understand the subject he was discussing.

Much of this obscurity is due to carelessness in the use of words and the repeated introduction of long parenthetical clauses. A Fellow of one of the colleges of Oxford University ought to be able to write clearer English, particularly when he is discussing scientific subjects.

The American editor seems to have realized these defects in Mr. Moullin's style, for he occasionally introduces in brackets short summaries of the preceding pages, as if he felt it necessary to attempt to bring some sort of order out of the chaos of involved statements. Such notes of the editor will be found on pages 31, 35, and 45.

An instance of the author's ill-use of the English tongue is the following extract:

"Unfortunately cleansing a wound with an antiseptic causes other effects as well. All antiseptics injure the tissues they touch to a greater or less extent, and increase the amount of fluid poured out (carbolic acid is probably the worst in this respect, iodoform the best); and many of them are used with water, which, unless it is thoroughly sponged out (again an irritant, of some importance, too, especially in connection with the peritoneum), adds still more to the quantity." Page 168.

An example of this lack of clearness in statement is this quotation taken from the beginning of the chapter on "Diseases due to Non-infective Organisms:"

"Of these there are only two—septic fever and sapræmia. These diseases are caused by the absorption from the surface of a wound of certain poisons produced during the fermentation or decomposition of albuminous liquids. Probably they are ptomaines, analogous to the bodies formed in the alimentary canal. If they enter the blood, they act as virulent poisons, the severity of the symptoms depending upon the amount of the dose; and they may cause a fatal result within a few hours. On the other hand, they do not multiply in the blood, which therefore is not infective if it is inoculated; they are excreted slowly by the kidneys (ptomaines, probably formed in the alimentary canal, are found in the urine and saliva), and if the patient survives the first effect and the dose is not repeated, the constitutional symptoms gradually subside. There is no incubation-period, and, other things being equal, a large wound, or one that exposes a large absorbent surface, such as the peritoneum, is much more likely to be attended with a severe attack than a small one."

On page 97 it is said that chancreoid or soft chancre is seldom followed by constitutional symptoms; while on page 99 the author makes the positive statement that "No constitutional symptoms ever follow a true soft sore." In the discussion of spina bifida we are told that "the only treatment that has met with success is the injection of Morton's fluid;" and yet in the next paragraph we are informed that excision of the sac has been practised successfully in certain forms of the lesion.

The statement is made that ether for general anæsthesia is always given through an inhaler, and that "drunkards can scarcely be got under its influence, unless they are partially intoxicated already." It would be difficult to convince the readers of *THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES* of the truth of these assertions.

It may seem to some unnecessary to call attention to these defects in Mr. Moullin's book, which really contains so much valuable information on surgical subjects. The reviewer would not do so if the faults of this kind were few, but the fact that the volume teems with such defects makes it necessary to mention the circumstance and prove the assertion by quotations.

Moullin's *Surgery* is a valuable work of reference for the experienced surgeon. It must be confusing and unsatisfactory as a text-book for college use, since students have not the knowledge to understand its lines or to determine the value of its contradictory statements.

Dr. Hamilton has made a valuable addition by the chapter on Military Surgery, which is full of suggestions useful in civil practice.

The omission in this edition of the full-page colored frontispiece, found in the first and second editions, is an evidence of appreciation of the artistic dignity that should pertain to scientific publications.

J. B. R.

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DIAGNOSTIK DER KRANKHEITEN DER BAUCHORGANE. Von Dr. med. et phil. HANS LEO, a. o. Professor und Leiter der medicinischen Poliklinik an der Universität zu Bonn. Zweite vermehrte Auflage. Mit 45 Abbildungen. Berlin, 1895.

DIAGNOSIS OF DISEASES OF THE ABDOMINAL ORGANS. By HANS LEO.

THE first edition of Leo's *Diagnosis* dealt solely with diseases of the organs of digestion. In the second edition the scope of the work has been enlarged so as to include the diseases of the urinary organs. Diseases of the spleen are also considered. He has wisely, therefore, altered the title of the book to *Diagnosis of Diseases of the Abdominal Organs*. The name is still a trifle misleading, however, as the diseases of the sexual organs are not taken up, a scanty paragraph only is allotted to diseases of the suprarenal bodies, and the diseases of the ureters are omitted. The intimate connection between the stomach and the œsophagus is Leo's warrant for describing the affections of the latter.

The work is divided into two parts, the first being the Examination of the Organs and the Clinical Characteristics of the Various Diseases, the second the Examination of the Secretions and Excretions of the Abdominal Organs (including the fluids of the mouth). This arrangement makes the work much handier as a reference-book, as the technique of chemical, microscopical, and bacteriological aids to diagnosis is considered apart from clinical signs, in a chapter by itself.

In the first part the diseases of separate organs are systematically taken up, a general consideration of the subjective symptoms and the physical examination preceding in each instance the discussion of the particular diseases.

The work necessarily partakes of the character of a compilation. Rare good judgment is shown in the condensation of material, in its systematic arrangement, and in the proper subordination of matter secondary, to



that of primary importance. In referring to the work as a compilation we do not wish to be understood as detracting from its merit or as underestimating the importance of the author's labor. The proper editing of scientific literary material demands unusual power of discrimination. Leo has shown his ability as an editor. The work gives evidence of a wide range of reading, of broad clinical experience, and of original work.

Diseases of the stomach are fully discussed. The chapter devoted to this subject, on which Leo has done so much work, shows the author at his best.

In speaking of the various tests for free hydrochloric acid he regards the phloroglucin-vanillin, or the resorcin-test (Boas), as the best and most reliable for general work. A negative result with these tests does not, however, prove that no hydrochloric acid is present. In case the test is negative, one must test still further with Leo's test ( $\text{CaCO}_3$ ). This test he regards as the only one whose negative result proves positively the absence of hydrochloric acid (p. 304). The constant absence of the free acid he regards as pointing suspiciously, but by no means positively, to carcinoma. He is likewise skeptical as to the clinical value of Boas's test for lactic acid, not regarding its positive result as necessarily indicative of carcinoma. It is also, he thinks, so much more complicated than Uffelmann's as to be really impractical.

The physical examination of the liver is exceptionally well described. We should be glad, however, to see some one frankly admit the great difficulty there is, in many cases, of palpating the surface of the liver to determine its smoothness or roughness. Not infrequently it is impossible to speak positively concerning the liver-surface unless conditions are peculiarly favorable. And yet many text-books would lead one to think that this can be as easily determined as the location of the apex-beat of the heart.

We are pleased to note that Leo asserts that many normal kidneys can be felt to move with respiration (p. 225). Also that because we can feel a kidney we are not to regard it as pathological or as dislocated (p. 224). Also that percussion, except in the case of enlarged kidneys, is of doubtful value as an aid in determining the location of the kidney. He takes, too, the middle ground as to the frequency of occurrence of movable kidney, believing that Litten with his figure at 75 per cent. (women) is too high, and Senator with 1 per cent. is too low.

The differential diagnosis between an enlarged or movable kidney and a pathological gall-bladder is not referred to, though the two conditions are at times readily confused.

One or two other omissions may be mentioned in this connection. No reference is made to hemorrhagic pancreatitis; nor is the intermittent fever attending occlusion of the gall-duct. Addison's disease, as has been said, is hurriedly dismissed. The practical ureometer of Doremus is not described.

In the chapter on the Examination of the Feces the methods of detecting cholera and typhoid bacilli are exceptionally full and merit special praise.

No one can read the book without receiving practical aid in the art of diagnosis. Yet somehow it seems to lack that quality of friendliness found in Leube, that makes Leube's work so valuable to the practitioner, that quality that makes you feel as though the author were letting you into

a secret, and were confidentially whispering to you a little point that he had learned by experience to be of value and in which he is willing you should be a sharer. While this makes Leube's work, in our opinion, of greater value to the experienced diagnostician who seeks the refinements and details of diagnosis, the student and practitioner will find Leo's *Diagnostik* thoroughly reliable, up-to-date, and containing in small space all the essentials of diagnosis of diseases of the abdominal organs.

J. B. H.

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CLINICAL ILLUSTRATIONS OF THE DISEASES OF THE FALLOPIAN TUBES AND OF TUBAL GESTATION. A Series of Drawings, with Descriptive Text and Histories of the Cases. By CHARLES J. CULLINGWORTH, M.D., Hon. D.C.L. (Durham), F.R.C.P. London: Rivington, Percival & Co.

THIS book contains the best macroscopical illustrations of the various pathological conditions which affect the Fallopian tubes which we have yet seen. The admirable drawings are from specimens which were removed in the course of the author's operative work.

All of the gross forms of tubal disease are represented, pyosalpinx, tubercular and gonorrhœal; hydrosalpinx, hæmatosalpinx, and tubal pregnancy. The author applies the term hæmatosalpinx to hemorrhage into the Fallopian tube caused by tubal pregnancy, and apparently does not reserve this term for those unusual cases of hemorrhage into the tubes unconnected with pregnancy.

Each illustration is a good type of the class which it represents. The illustrations are accompanied by short clinical histories of the origin and course of the disease. The cases of pyosalpinx were chiefly of gonorrhœal origin.

Two of the illustrations represent very rare conditions: one an indisputable case of complete tubal abortion in which the embryo was between the third and fourth week of development, and the other primary carcinoma of the Fallopian tube.

The author states, on the authority of Mr. Doran, that only seven instances of primary carcinoma of the Fallopian tube had previously been reported in a satisfactory manner. The frontispiece is a very good drawing of the uterus, Fallopian tubes, ovaries, and broad ligaments as seen from behind in the healthy adult. Such a preface is very appropriate in a series of drawings of diseased Fallopian tubes.

The value of this book depends upon the illustrations, which render it especially useful to any one engaged in teaching gynecology.

C. B. P.

# PROGRESS OF MEDICAL SCIENCE.

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## THERAPEUTICS.

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UNDER THE CHARGE OF

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### THE THERAPEUTIC USES OF MESCAL BUTTONS.

DRS D. W. PRENTISS and FRANCIS P. MORGAN suggest the therapeutic uses of mescal as follows: As an antispasmodic in abdominal pain, irritable cough, nervous headache, hysteria, spasmodic asthma, convulsions, and as a substitute for opium and chloral in delirium, great nervous irritability and restlessness, and in insomnia due to pain. As a cerebral stimulant in melancholia, hypochondriases, and in some cases of neurasthenia. The drug may be used in color-blindness, because it possesses a remarkable power of producing visions of color. The following preparations may be used: *tinctura anhalonii* (10 per cent.), dose one to two teaspoonfuls; *extractum anhalonii fluidum* (100 per cent.), dose 10 to 15 drops; *pulvis anhalonii*, dose 7 to 15 grains. The taste of the liquid preparations is somewhat disagreeable, unless it be disguised by some suitable vehicle, as fluid extract of liquorice or elixir of yerba santa. The powder is best administered in wafer paper, cachets, or capsules.—*Therapeutic Gazette*, 1896, No. 1, p. 4.

[For the preliminary paper see THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, 1895, vol. cx., No. 6, p. 699.—R. W. W.]

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### THE ACTION OF ANEMONIN.

DOTT. G. NOLA concludes from his experiments that (1) this drug is a poison of slow action whatever may be the dose. (2) The phenomena embrace three distinct periods: hypnotic, paralytic, and convulsant. (3) The paralytic period can be marked by two phases: in the first the sensibility and the reflexes are preserved; in the second one or both are abolished or markedly depressed. (4) This picture is constant for large or medium doses; with small doses there may be only a hypnotic action with return after some time to a physiological condition. (5) The first two effects (sleep, paralysis) are constant, although in different degree, in all animals and in



every dose; convulsions may be wanting, but only occasionally. (6) They vary in intensity and form from simple isolated spasm to true tonic-clonic convulsions. (7) The sleep, as from other hypnotics, is probably due to the physiologico-chemical action of the drug upon the cerebral cortex. (8) The paralysis is of central origin, with the participation at first of the medulla, and later of the spinal cord. (9) The convulsions are of bulbar origin. (10) The respiratory and circulatory functions are not at first influenced; but later they are depressed, as are all the other organic functions. (11) Death occurs with complete muscular resolution through arrest of respiratory mechanism.—*La Medicina Contemporanea*, 1896, No. 1, p. 55.

#### THE TREATMENT OF CHOREA.

DOTT. E. DE RENZI has made use of eserine, antipyrine, salol, and ether-spray along the vertebral column, but he has confidence in only three remedies: (1) Absolute rest, avoiding any external excitation whatever, and placing the patient in a dark room. (2) The ascending electric current along the spinal cord—the best results with a gentle current, progressively increased. (3) Arsenic in large doses, commencing with twenty drops of Fowler's solution each day for children, and double this amount for adults. When the chorea ceases the medicine should be continued, for the disease returns readily. The nutrition of the patient must be maintained, and good food and gymnastics are useful.—*Gazetta degli Ospedale et delle Cliniche*, 1896, No. 29, p. 306.

#### THE ASSOCIATION OF CERTAIN ANTITHERMICS AND ANALGESICS IN INTERNAL THERAPEUTICS AND OPHTHALMOLOGY.

DRS. E. BERGER and E. VÖGT recommend the following formula: antipyrine, 5; phenacetine, 2; acetanilide, 1. Of this the dose is seven and one-half grains. In pulmonary tuberculosis the hectic fever has been controlled without inconvenience for weeks and months by three doses each day. In facial neuralgia and typical migraine fifteen grains given at half to two-hour intervals have yielded good results. In the gastric crises of tabes, various rheumatic affections, lumbago, torticollis, the results have been satisfactory. Among ocular disease we find various indications for its use: corneal ulcers, irido-cyclitis, chronic iritis, keratitis. In rheumatic iritis it is inferior to sodium salicylate.—*Revue de Thérapeutique*, 1896, No. 4, p. 104.

#### THEOBROMINE IN DISEASES OF THE HEART AND KIDNEYS.

DR. H. HUCHARD notes that the diuretin of commerce is not a chemical combination, but a mixture which should be banished from therapeutics. It is prepared by dissolving 18 per cent. of theobromine in a 4 per cent. solution of caustic soda, to which 16 per cent. of sodium salicylate is added. Sée has pointed out the harmful effects of the caustic soda, and further to obtain diuretic results it is necessary to double or even treble the usual dose. Geissler, after eight days' use of this drug, noted tachycardia, arrhythmia, and even cyanosis—none of these occurred with pure theobromine. We cannot accept the statement that theobromine is caffeine deprived of its excitant

properties, because when we exceed the dose of thirty to forty-five grains, and especially seventy-five grains, we note a headache, which is more or less severe, although there are individual idiosyncrasies. This headache is peculiar in that it is not pulsatile as is that of glonoin, nor buzzing and vertiginous as is that of quinine, but commences in one of the temples and extends gradually to the other side, even reaching to the occipital region, where it remains fixed as a constrictive pain. This occurs in about 10 per cent. of the cases, and is likely to be so unbearable that in spite of the good results of the drug it must be abandoned or given in small doses. Twice only has cerebral excitement been noted, but not to the extent of delirium. More rare are digestive disturbances, especially after large doses, as nausea and vomiting. The drug acts directly and electively upon the renal epithelium, and in only a single instance did it give rise to albuminuria from a kidney previously healthy; but in three instances of patients suffering from albuminuria and cardiac disease which had reached the point of asystole, with peripheral œdema and visceral congestion at the time when from diuresis there was an absorption of the œdema, the albumin has notably increased. The drug does not increase the blood-pressure nor act directly upon the heart, although in several instances the cardiac impulse became stronger and the pulse slightly less frequent. The diuresis commences with the first day of its administration, and continues several days after the withdrawal of the drug. On the second or third day it may be four or five quarts. Practically it holds a middle place between that of digitalis, slow to appear and slow to disappear, and that of caffeine, which is less abundant, less sure, and less persistent. The mode of administration is: the first day, six capsules of 8 grains; the second, eight; the third, ten; and this dose to be continued for three or four days more. At times it may be necessary to continue it for a longer time; this can be safely done, for it is but slightly toxic.—*Nouveaux Remèdes*, 1896, No. 2, p. 32; *Revue de Thérapeutique*, 1896, No. 3, p. 69; and *Bulletin Général de Thérapeutique*, 1896, 3e liv., p. 45.

M. BARDET objects to the theory that this drug acts especially upon the renal epithelium, believing that the diuretics capable of acting upon the epithelium exercise a dangerous alterant action. No drug is capable of acting upon ascites, in preventing the extravasation of liquid contained in the vessels, unless it possesses at the same time the property of increasing arterial tension and of diminishing the tendency to capillary stasis. Therefore, the explanation of its value as a diuretic rests to a great extent upon its vasomotor activity, but it is placed second to caffeine, as brucine takes rank after strychnine.—*Bulletin Général de Thérapeutique*, 1896, 3e liv., p. 84.

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#### THE TREATMENT OF ENURESIS.

MR. E. N. NASON reports that a woman of twenty years had suffered from the earliest childhood, scarcely ever missing a night, and on some occasions wetting the bed two or three times in a single night. After the usual medication had failed a solid No. 10 catheter was passed into the bladder and connected by a tube with an irrigating basin, containing a measured quantity of boric acid solution. The basin was raised from one to two feet and the bladder injected, until the patient complained of slight pain, when it

was lowered. The positive electrode of a constant-current battery was applied over the lumbar spine and the negative placed in the fluid in the basin, thus completing the circuit through the liquid in the basin, tube, and bladder. A weak current was than allowed to pass for some ten minutes. This was repeated every evening for a fortnight, then at longer intervals. By this method a current of electricity would, after passing from the neighborhood of the lumbar cord through the vesical nerves, be evenly distributed over the walls of the distended bladder. The toleration of the bladder was rapidly increased from four ounces on the first occasion to twenty ounces at the end of a fortnight. After some months of treatment the urine could be retained for a much longer period, and the patient has been practically well for nearly four months.—*British Medical Journal*, 1896, No. 1832, p. 336.

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#### HÆMATO-CATHARSIS.

DR. PIERRE DELBET ascribes the method of blood-lavage to Dastre, who in 1888-89 showed what use could be made of it in infectious diseases. With animals inoculated with cultures of pathogenic microbes or with toxins of microbic origin washing the blood only hastened the evolution of accidents and the fatal termination. Three observations were reported. The method consists of the repeated intravenous injection of artificial serum (1 to 2 quarts). Three striking phenomena are observed: a chill, a sensation of comfort, and a lowering of the temperature. The injection is intended to fill the vascular system to repletion, when elimination by the kidneys will follow. The useful effect of the injections appears to be directly proportioned to the quantity of fluid eliminated by the kidneys. The increase of blood-hydration apparently prevents absorption if we may so conclude from an experiment with strychnine which is here reported. If the blood-mass is much diminished, absorption will take place rapidly from cellular tissue up to the time when the former reached its highest point; after this absorption is insignificant.—*La Presse Médicale*, 1896, No. 16, p. 93.

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#### CHARCOAL.

DR. ROBERT B. WILD has made a careful laboratory study of this drug and finds that externally it is a very dirty application if used in sufficient quantity, and for ordinary cases the present antiseptic drugs are more cleanly and more effectual, and are not likely to be superseded by charcoal. Internally it has been used when there is undue decomposition of the contents of the alimentary canal, such as occurs with dilatation of the stomach, certain forms of gastric or intestinal indigestion, and other conditions when the alimentary canal contains abnormal toxic substances, and in certain specific diseases presenting local lesions of the alimentary canal. Many of these, as cholera, typhoid fever, dysentery, and certain forms of diarrhœa, are due to living organisms, and of recent years the view is more and more gaining ground that many of the symptoms in these cases are due not so much to the living organisms as to the formation of various toxic substances (*e. g.*, the typho-toxin of Brieger and Fraenkel), which exert an injurious action upon the alimentary canal, or by their absorption from it produce a more



general intoxication. Charcoal appears to be worthy of further trial, although devoid of antiseptic properties, from its action by oxidizing the chemical substances formed during abnormal decomposition or the various toxins produced by pathogenic organisms. This action may be direct or indirect through the aërobic process of putrefaction, and it is possible that a supply of oxygen contained in the charcoal may modify the metabolic processes of the pathogenic organisms themselves, and render them or their products less virulent. The power of this drug to remove alkaloids from solution is worth considering, as certain toxins and ptomaines are possibly of this nature. Thus it may prevent auto-intoxication from the alimentary canal, and, as has been suggested, also act as a laxative or remove mucus from the walls of the alimentary canal. It may be administered in from two to six teaspoonfuls—and increased—daily. Charcoal obtained from some kinds of wood absorbs a larger volume of gas than that obtained from others. Belloc claimed that poplar charcoal was superior, but the Commission of the French Academy found only that it was of extreme porosity.—*The Medical Chronicle*, 1896, No. 6, p. 401.

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#### STYPTICIN.

DR. H. GAERTIG has made use of this remedy during the past two years in the form of powder administered in wafers, in solution (ten drops representing about one grain), and finally in gelatin pearls; the last method is preferable. The dose is about one grain twice to eight times daily. The use of six doses each day for many weeks gave rise to no inconvenience. Forty-six instances of its use are briefly presented. Among these may be cited: seven of menorrhagia; endometritis with hemorrhage, eleven; complicated and simple retroflexion, eleven; uterine subinvolution, *post partum* or *post abortum*, seven; climacteric hemorrhage, three; hemorrhage following inflammation of the appendages, with retroflexion, once, without retroflexion twice; hemorrhage from myoma, four; and hemorrhage after threatened abortion once. The most positive results were obtained in uncomplicated menorrhagia and in that of the menopause. The drug is apparently valuable for the hemorrhage of subinvolution and for that associated with inflammatory conditions of the appendages.—*Therapeutische Monatshefte*, 1896, Heft 2, S. 70.

[See also THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, 1896, vol. xxi., No. 3, p. 339, for composition and manufacture of this drug.—R. W. W.]

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#### BONE-MARROW IN ANÆMIA.

DR. CAROLINE S. PÉASE reports seven cases of simple anæmia. The preparation was made by macerating for four days the finely broken cancellated bone of sheep's ribs containing the red marrow in pure glycerin at 70° F., and straining the resultant fluid through flannel. Weekly examinations were made as to hæmoglobin, red corpuscles, leucocytes, and weight of patients. The initial dose was intended to be a dessertspoonful thrice daily; by accident double this quantity was given, resulting in diarrhœa. The former quantity even being laxative, probably on account of the glycerin, the dose was reduced to one teaspoonful. During the five weeks under observation

the percentage of hæmoglobin was increased from an average of .47+ to an average of .87+; the number of red corpuscles was increased from an average of 4,084,000 to an average of 4,731,000; and the number of leucocytes was decreased from an average of 15,000+ to an average of 6000. The changes in weight during treatment were practically none, there having been a gain of only one and a half pounds in the aggregate weight of the seven patients. With reference to the rather low percentage of hæmoglobin, it may be said that with the Gowers hæmoglobinometer (which was used in these cases) Stockton states that the normal percentage in women is only from 82 to 88, and Henry and Stengel believe that it is unusual to reach 95 to 100 on this instrument. [With a recently manufactured instrument Stockton's observation is probably correct. The liquid in the colored standard tube, however, fades so that the percentage later becomes correct, as shown. R. W. W.]—*New York State's Hospital Bulletin*, 1896, No. 1, p. 133.

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#### BONE-MARROW IN DIPHTHERIA.

DOCT. A. TRAMBUSTI, noting the importance of the leucocytes as organs of protection against an infective disease, acting not only as phagocytes, but as well through their elaboration of a chemical substance which is capable of conferring microbicidal powers upon the blood-serum, has studied the structural modifications of these elements in the course of an infection, and also under the action of a toxic substance of bacterial origin. These modifications have been observed in the experimental diphtheria of healthy rabbits, either from inoculation with active cultures of the bacilli of diphtheria, or from subcutaneous injection of varying quantities of the toxin of diphtheria. Observations have been made upon the bone-marrow at different periods of the infection, and after more or less grave intoxication. The results are as follows: Bone-marrow reacts in the course of an infective diphtheritic process with great functional activity of the cellular elements of which it is composed. This energetic functional activity of the cellular elements tends more toward the function of secretion than to that of reproduction. This increased function of secretion shows itself microscopically both by a greater quantity of granulations in the interior of the cell-plasma, and by a greater quantity of free granulations. This great functional activity of the cellular elements is diminished, with the progress of the infection, by the accumulation of a greater quantity of toxic material within the organism. Although this material in small dose stimulates the above-mentioned energy, yet it here acts as a paralyzant and in producing necrosis. The results which he has obtained from the use of bone-marrow justify his belief that the leucocytes produce a substance which is bactericidal and antitoxic.—*La Settimana Medica*, 1896, No. 4, p. 55.

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#### ANTITOXIN IN DIPHTHERIA.

DR. JOHN WINTERS BRANNAN, from his observations in the Willard Parker Hospital, states that the reduction in mortality began with the introduction of the serum-treatment and became more and more marked as the year progressed. These improved results are probably due to the greater strength of the serum employed, as well as to the more efficient dosage

during the later months, the natural consequence of longer experience in its administration. From a study of the tables of cases of "deaths according to day of disease upon which treatment was begun," he concludes that this, though far from supporting the claim that antitoxin is a specific in diphtheria, apparently proves conclusively that the new treatment, when applied early in the disease, gives much better results than the older methods. Among the causes of death we note a much greater mortality from bronchopneumonia under antitoxin, while that from laryngeal stenosis and sepsis has markedly diminished. The mortality among patients upon whom tracheotomy or intubation has been performed has also diminished—from 85 to 68 per cent. The death-rate among patients between the ages of two and twelve years shows a lowering, while the showing of antitoxin when administered to patients over sixteen years is unfavorable. The tables cited demonstrate fairly that diphtheria-antitoxin has considerable therapeutic value, even in hospital-practice, an admittedly poor field for a demonstration of its curative action. The remedy often had a favorable effect upon the laryngeal symptoms, especially of the intubated cases; but no effect is noted, favorable or otherwise, upon either the pulse or the temperature, nor has there been any "melting away" of the membrane. As to the untoward effects, albuminuria has been observed rather more frequently, but casts and other evidence of nephritis have been absent. With the exception of simple regurgitation, due to temporary paresis of the palatal muscles, post-diphtheritic paralysis has been noteworthy by its absence.—*International Medical Magazine*, 1896, No. 12, p. 818.

#### ANTIDIPHThERIC SERUM AND LOEFFLER'S SOLUTION.

DR. BURT RUSSELL SHURLY reports twenty-five cases, of which two died. The formula of the solution is as follows: Menthol, 10; toluene to 36; to this are added creolin, 2; solution of iron chloride, 4; and alcohol to 100. A small piece of absorbent cotton is wrapped about a wire applicator and, saturated with the solution, is firmly pressed against the exudate for from ten to twenty seconds, at intervals of from three to four hours. Twenty minutes after each application the throat is irrigated with hydrogen peroxide, 1; listerine or euthymol, 1; and Dobell's solution or aqua calcis, 3 to 5. The diagnosis of diphtheria was verified by bacteriological examination. Among the facts observed are the following: No patient died who was treated within two days of invasion. None developed laryngeal stenosis after antidiphtheric serum was given. None developed anuria, convulsions, abscesses, nor became septic. Albuminuria without casts developed in eight cases. Paralysis appeared in four cases, rash in eight. He concludes that the subsidiary local and constitutional treatment must not be neglected, and that antitoxin is a specific remedy when used early.—*Therapeutic Gazette*, 1896, No. 2, p. 81.

#### SNAKE-VENOM ANTITOXIN.

MR. E. H. HANKIN states that the poison secreted by the microbes of tetanus and diphtheria are closely allied to, if not indistinguishable chemically from, the poisons secreted by venomous snakes. Mitchell and Wol-



fenden have discovered that the venom of snakes owes its properties to the presence of a poisonous albumin, that of the cobra, according to the author, being so active that for the mouse the lethal dose of the dried poison has been found to be no more than the thirteenth-millionth part of its body-weight. Sewall showed in 1887 that it was possible to make pigeons immune against rattlesnake-venom by injecting into them a series of minute doses of this substance. The question of the possibility of producing antitoxins which might neutralize the poison of venomous snakes has been taken up by Calmette and Fraser. Both have succeeded in producing a high degree of immunity against snake-poison in animals, and both have found that serum of such animals possesses the power of neutralizing cobra-venom. The former claims that the activity of his antivenine is ten thousand units. There is little doubt that antivenine would produce immunity in a safe and easy way if injected an hour previous to the bite, and in a small dose. While it is easy to produce an immediate though temporary immunity, it is comparatively difficult to effect a cure when once the symptoms have arisen. Hence, the one hope of success is to inject the remedy at a sufficiently early stage after the bite. The limb should be well ligatured, in hope that the remedy may be absorbed into the system in advance of the poison. Since death within half an hour after the bite of a venomous snake is the exception, and since, as a rule, more than three hours elapse before the fatal issue, and further that antivenine, even when used an hour and a half after the bite of extremely venomous snakes, has been found to be efficacious, there is good reason for expecting favorable results from this treatment, which has been found to be active against the poison of all species of snakes in which it has hitherto been tried. The injection is made under antiseptic precautions, into the subcutaneous cellular tissue of the flank. Then with the same syringe injections of aqueous solutions of lime chloride (1 to 60) are made about the bite which has been previously washed with the same solution. Neither alcohol nor ammonia should be administered, since these may interfere with the action of the remedy.—*Indian Medical Gazette*, 1896, No. 2, p. 56.

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#### THE SERUM-THERAPY OF VARIOLA.

M. A. BÉCLÈRE reports that a woman, aged twenty-nine years, entered the hospital on the third day of the eruption. She received under the skin of the abdomen, within an hour, about fifty ounces (one-fiftieth of her body-weight) of the serum of a vaccinated heifer. The patient was rapidly and perfectly cured without any general or local disturbance from this enormous injection of serum. She had been vaccinated but once, and that was at the age of two years. Thirty-two days after the injection desquamation had been completed. The author claims that this treatment is rational and legitimate when applied in sufficiently large quantities, the serum being drawn from healthy animals and all antiseptic precautions being observed.—*Journal des Praticiens*, 1896, No. 14, p. 51.

[However in this carefully reported case it may be remarked that the treatment did not prevent suppuration, there were some pain and erythema at the site of the injections, and there was late (nine days after injection) erythema resembling urticaria.—R. W. W.]

## ANTICHOLERA INOCULATION.

DR. W. M. HAFKINE concludes his elaborate report of his operations in India as follows: The physiological and pathological effect in man has been studied on some sixty persons, mostly medical and scientific men, and found to be harmless. During the first year 22,703 people of all classes were inoculated. In the second year 19,473 individuals, in some of the most affected localities of India, were inoculated. The results obtained seem to indicate that in the inoculations we possess a means of effectively combating cholera-epidemics.—*Report to Government of India*, 1895.

[A careful study of tables leads to the belief that the above-stated conclusions are based upon sufficient evidence.—R. W. W.]

## SERUM-THERAPY BY THE INTESTINAL ROUTE.

M. CHANTEMESSE, seeking to obviate the pain and other accidents of subcutaneous injection, has made twenty experiments which convince him that the serum is readily absorbed by the intestinal mucous membrane, and at the same time does not give rise to any inconvenience. The rectum is washed out and the injection made. There is no pain nor any disagreeable manifestation, not even erythema. Its efficiency is equal to that by former methods, and as a preventive it appears to be of the same value in equal dose. Six to ten ounces of Marmorek's serum in severe erysipelatous infection have been injected without inconvenience. In three cases of diphtheria Roux's serum has appeared to be equally efficacious when used in this way.—*Journal des Praticiens*, 1896, No. 6, p. 93.

## THE TREATMENT OF TETANY BY THE THYROID EXTRACT.

DR. MAX LEVY-DORN, noting that tetany as well as myxœdema has not rarely been observed after extirpation of the thyroid gland, suggests this treatment. The patient presented none of the symptoms of myxœdema and possessed an apparently healthy thyroid gland. Tablets, one to three daily, consisting of four grains of thyreoidin, were used for about a month with the result that the symptoms had entirely disappeared. Four months later it was found that there was no recurrence, so that it may be assumed that the cure was perfect.—*Therapeutische Monatshefte*, 1896, Heft 2, S. 63.

## THE TREATMENT OF A "COMMON COLD."

DR. L. DUNCAN BULKLEY recommends the use of sodium bicarbonate in amounts of from twenty to thirty grains in two or three ounces of water every half-hour for three doses and the fourth to be taken at the expiration of an hour from the last one. Two to four hours are then allowed to elapse to see what effect has been obtained, when the four doses are to be repeated, if it is necessary, as is frequently the case. After waiting two to four hours more, the same course is to be taken again, although this is not often necessary, if the treatment has been begun early in the course of the "cold." This method relates more especially to the early stage. To be promptly effective, it should be commenced with the earliest indications of coryza and sneezing

After the second or third day it acts less promptly and more frequent repetitions are needed. When the influenza has more of a contagious character it is less efficacious, but still is often of service. In these cases five to ten grains of phenacetin with ten to twenty of sodium bicarbonate with hot water given every two hours continuously for a day or two give excellent results. The *modus operandi* of the treatment is based upon the idea that there is an acid condition of the system which is sufficient to irritate the terminal endings of the nerves in the skin and mucous membranes, and to render them susceptible to impressions of cold by a derangement of the capillary circulation. The remedy seems to act by relieving the internal cause of the surface irritation. The dose so often repeated has never given rise to any later ill effects.—*The Medical Record*, 1896, No. 1315, p. 86.

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#### THE HÆMATOGENIC POWER OF THE HEAVY METALS.

DOTT. GIUSTO CORONEDI believes that other metals than iron may favorably influence general nutrition. Experiments based upon the use of Fleischl's hæmoglobinometer give the following relative value of the metals in their action upon hæmoglobin: Mercury, 17; iron, 13-15; copper, 10; manganese, 9; zinc, ?. Mercury, however, because of its poisonous properties must yield the first place to iron. Copper-hæmol, as prepared under the direction of Kobert, can be administered in pill-form with mucilage, each containing one and one-half grains, of which the daily dose is from three to four. In this way an excellent result was obtained without gastric disturbance, in a case of profound anæmia consecutive to severe chronic gastritis.—*La Settimana Medica*, 1896, No. 1, p. 9.

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#### COLD BATHS IN DELIRIUM TREMENS.

M. LETULLE notes the various drugs which have been used, and recommends bathing, not the simple douche, more or less prolonged, but immersion of the whole body, even to the shoulders, in water at the temperature of 64.4° F. Further, the head should be cooled by large waves of water of the same temperature, and this should be persisted in for the same time as the bath, which should last 8, 12 to 15 minutes, according to the reaction of the patient. These baths may be repeated every two or three hours. In two instances, reported in detail, the gravity of the condition was such that favorable results were not hoped for. Although from this number of cases no rules can be formulated, the conclusion may be suggested that these baths possess a sedative and calming action upon these cases.—*La Presse Médicale*, 1896, No. 4, p. 20.

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#### THE TREATMENT OF INOPERABLE MALIGNANT NEOPLASMS BY ANILINE-DYES.

DR. R. V. MOSETIG-MOORHOF has made use of this method for the past six years. The colors employed have been methyl-violet, methylene-blue, Bismarck-brown, and methyl-green, generally in 1 per cent. solution by injection. Ulcerations have been treated with strong solutions, with the remedy in the form of powder, and fistulous tracts by pencils. Methylene-



blue, which is readily soluble, has been given internally in dose from one and one-half to five times that quantity in form of pills, with extractum scordii or teucrin, as a vehicle, which enables it to be well borne by the stomach. This drug may give rise to a greenish-blue urine, but to no other untoward symptoms. To demonstrate if the accidental injection into a vein would give rise to dangerous symptoms, both methylene-blue and methyl-green were injected into the veins of a dog; no unpleasant results followed. When cachexia resulting from neoplasms exists, this is markedly benefited by administration of the aniline colors *per os*. Observations show that not only does living tissue take up the dyes, but also that cell-material can reduce them, and that they are carried along the lymph-channels. This method resulted in general improvement of the patient's condition, lengthening of his life, and the reduction in size of the tumor of the cases reported four years ago: 1. Myeloid sarcoma of the body of the lower jaw treated by pyoc-tanin; lived for sixteen months in generally good condition and able to work, and died from croupous pneumonia. On necropsy there was only a small remnant of the sarcoma, but no metastases. 2. Large sarcoma of the retro-peritoneal space; lived for five years in good general condition, and died from influenza. 3. Markedly reduced tumor; worked as a caretaker, and died seventeen months later from pleuro-pneumonia. To these is added a recent case of villous carcinoma of gall-bladder which was treated by enucleation followed by pencils of methylene-blue, and later by three grains of the same each day, by the mouth, in addition. For several months there was steady improvement, until communication became established between the duodenum and the fistulous opening remaining after the operation, which resulted in death. Other reported cases are alluded to, and the author, from his large experience, sees no reason to revoke the opinion previously expressed.—*Centralblatt für die Gesamte Therapie*, 1896, Heft 1. S. 1.

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#### A NEW METHOD OF ANTISEPTIC WOUND-TREATMENT.

DR. C. L. SCHLEICH states that if a watery solution of gelatin be dried after exposure to formalin-vapor, there results a new chemical body possessing entirely new properties. This preparation in contact with animal tissues results in the breaking up of the absorbable gelatin, lasting for several hours, and the gradual setting free of the formalin. In this way the action of the drug is continued over a considerable period of time. The results of the use of this antiseptic in powder-form have been that in one hundred and twenty cases of acute purulent processes, ninety-three of aseptic healing of wounds, four complicated fractures, and two deep wounds of the scalp, success without exception has been obtained. In all instances of acute suppuration the inflammation has been brought to an end within twenty-four hours, the fractures healed aseptically and without fever, and aseptic operations pursued an uneventful course. In the presence of fresh blood and clean condition of the wound the powder gave rise to a dry and permanent scab. In recent suppuration without necrosis the process was brought to a standstill within twenty-four hours. Boils, carbuncles, and phlegmons can be limited within the same time if the powder is brought into contact with the tissues. The process of manufacture is as follows: A pound of dissolved and purified

gelatin is brought in contact with twenty-five drops of a pure solution of formalin. The dried masses are rubbed up or powdered, and preserved dry with the addition of some drops of formalin.—*I herapeutische Monatshefte*, 1896, Heft 2, S. 57.

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#### VASELINE SPRAY IN THE TREATMENT OF CHRONIC NASAL INFLAMMATION.

DR. THOMAS F. RUMBOLD, after twenty-three years' experience, feels justified in asserting: (1) That we have no agent nearly so valuable as a local application to the upper air-passages as vaseline; it is the most useful cleanser and antiseptic, and the most rapid of all solvents of abnormal nasal secretion, whether in the semifluid or solid form, that has ever been employed. (2) That there are no means of making local applications that nearly equal properly constructed spray-producers whose action is perfectly non-irritating, while most thorough in reaching the unseen surfaces that are almost always diseased. The objects of this treatment are: (1) To remove the abnormal secretion from the inflamed mucous membrane; and (2) to apply a warm, soothing antiseptic to every portion of the inflamed nasal passages. The treatment should be perfectly painless, and is made by instruments carrying the spray in four different directions and actuated by an air-pressure of from two to eight pounds to the square inch. In all cases, especially in those in which there is much muco-purulent discharge, a small quantity—barely enough to taste—of eucalyptol is added.—*St. Louis Medical and Surgical Journal*, 1896, No. 3, p. 147.

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#### THE TREATMENT OF TETANUS.

DR. E. F. TREVELYAN reports a single case of cephalic tetanus treated by injections of antitoxic (antitetanic, Roux) serum. This was without result, although two successful cases have been reported by Caretti and by Einsti and Buonati. This disease is also known as *tetanus hydrophobicus* owing to the pharyngeal spasm induced by attempts at swallowing, *tetanus paralyticus* as proposed by Klemm to emphasize the importance of the facial paralysis, and bulbar tetanus to accentuate the fact that bulbar symptoms are so frequently present. There is, however, no real difference between cephalic and ordinary tetanus, as is shown by the fact that the muscular spasm tends to become general in both; in fact, it is only a difference of mode of ingesta, the former resembling more closely experimental tetanus. Failure in this case may have been due to an insufficient quantity used or to the use of the warm water in dissolving the desiccated serum. This is the third instance in which the author has observed the use of the remedy—in one the Tizzoni-Cattani serum was employed—and in all it did not appear to have the slightest effect upon the disease.—*British Medical Journal*, 1896, No. 1832, p. 321.

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#### THE DEFECTS IN THE SYSTEM OF ARTIFICIAL RESPIRATION.

DR. A. E. WRIGHT calls attention to certain grave defects in the system as ordinarily applied to the treatment of chloroform-collapse and asphyxia. He recommends opening a major artery before proceeding to apply artificial res-

piration. Under ordinary conditions we undertake to drive air in front of the aërated blood, a considerable volume of vitiated blood, and also to overcome a very considerable resistance in the arteries. His method provides an outlet through which we can evacuate the greater part of the vitiated blood and can reduce the arterial resistance so that the enfeebled heart can resume its beat. In man it would be well, in case of chloroform-collapse, carbon-dioxide-poisoning, drowning, and asphyxia, to open both temporal arteries. To prevent the fatalities which occur in the early stages of chloroform administration preliminary injections of atropine are of eminent utility.—*British Medical Journal*, 1896, No. 1830, p. 203.

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#### THE TREATMENT OF RHEUMATISM.

DR. LOUIS FANGÈRES BISHOP states that in the presence of an acute attack we should give salicylic acid, either as salicin, oil of wintergreen, or fresh sodium salicylate, in sufficient quantities to relieve pain and lower the temperature. The failures arise from insufficient quantity of the drug, either from lack of appreciation of the necessity, or because some patients cannot stand it. Alkalies are generally believed to protect the heart, and are best administered as sodium bicarbonate in drachm doses as often as is practicable until the urine becomes alkaline. For chronic rheumatism twenty grains of salicin every two hours should be given until relief of pain, then continued in the same dose three times daily. The digestion should not be overtaxed; carbohydrates, as potatoes, should be limited. Milk is a very good food, and cod-liver oil is often extremely beneficial.

DR. BEVERLY ROBINSON did not think it was best to give large amounts of the salicylates because of their depressing effect, and it was well to combine with them a little colchicum. He had also used ammonium chloride and potassium acetate, ten to fifteen grains of each every two hours, with good results.—*Medical Record*, 1896, No. 1317, p. 150.

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#### CREOSOTE-POISONING.

M. FAISANS reports that a student of pharmacy, aged twenty-six years, suffering from pulmonary tuberculosis in the second stage, had been treated by injections of creosote oil, 1 to 15. For three weeks he had received these injections in daily doses of from two and one-half to thirty-five drachms of the oil. The symptoms resembled those of tuberculous meningitis, but the absence of fever, vomiting, constipation, stiffness of the neck, convulsions, irregularities of the pulse, and respiratory movements sufficed to make the diagnosis, which was confirmed by the recovery of the patient. Besides the well-known toxic symptoms of this drug, black urine, profuse sweats, depressed temperature, creosote may determine accidents which constitute a new variety of pseudo-meningitis.—*Journal des Praticiens*, 1896, No. 4, p. 61.

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#### DUBOISINE-POISONING.

DR. C. A. VEASEY reports a single instance, that of a woman, aged twenty-seven years, who instilled one drop of a 1 to 240 solution into each eye.



She shortly after felt heated and flushed, and soon it was almost impossible to walk. Forty minutes after the instillation she talked in an incoherent manner, could not walk without assistance, her gait was of a draggy character, and she was intensely excited. The throat was exceedingly dry, the pupils moderately, but not fully, dilated. The face and hands were flushed, resembling a scarlatinous eruption; the pulse was small but strong and rapid, 128 beats to the minute; the respiration shallow and hurried, 28 to the minute. Within the next half-hour the patient lost all control over herself, not being able to raise her head, arms, or legs without assistance, though she was at times able to move her fingers. The flush was now disappearing and she was becoming pale in spots; the speech was reduced to an occasional whisper and no proper replies to questions could be obtained. The pulse had also become soft and compressible, though but slightly reduced in rapidity; and the respirations had fallen to 14, and were still shallow. There seemed to be partial anæsthesia. After lasting for three hours these symptoms began to disappear gradually and within an hour the patient was able to take a carriage.—*The Philadelphia Polyclinic*, 1896, No. 13, p. 121.

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#### A SUGGESTION IN ETHER ADMINISTRATION.

DR. DAVID H. LUDLOW states that when ether is mixed with twice its volume of a bland, light preparation of liquid petroleum and thoroughly nebulized with a suitable atomizer, it is absolutely unirritating, and even with a much smaller proportion of oil is practically so. A little cocaine (the alkaloid) may, if desired, be dissolved in the ether before adding the oil, but it is unnecessary. The oil, by preventing the irritation (not merely cutting off the connection with the central nervous system as the cocaine does), avoids not only immediate reflex disturbances, but all direct injury to the mucous membrane, and also, consequently, the later reflexes, which, with cocaine alone, are likely to be troublesome after the local anæsthesia has passed off. A few puffs of the mixture from the atomizer directly into the nostrils before administering ether in the usual way result in the anæsthetic being easily taken, without stage of excitement and with practically none of the common annoyances incident to its use. In this way it is hoped that the objectionable features of ether-anæsthesia, which are to be attributed directly or reflexly to its irritation of the mucous membrane, can be lessened or prevented.—*The Philadelphia Polyclinic*, 1896, No. 6, p. 55.

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#### WATER-PARSNIP-POISONING.

DR. HERMANN GRAD reports two cases. Two boys, aged thirteen and fifteen years, ate some roots, found in a swampy place, which they took to be parsnips. The younger one felt sick, perspired freely, was pale, his head was drawn to one side, but there were no convulsions. As a result of emetics he vomited freely, his face twitched a few times, but he made a rapid recovery, and ate a good breakfast the following morning. The elder vomited slightly, was pale, and perspired freely, and about three hours later became unconscious, the pulse was full and slightly accelerated, the breathing deep and noisy, all the muscles of the face twitched so that at times his mouth

would be tightly drawn together, the face would become deathly pale, and the skin covered with cold perspiration. Suddenly the twitching would cease, but in a short time the fingers would again begin to move, and with extreme rapidity the convulsions would become general. The head would be drawn backward, the breathing entirely suspended, the pulse feeble and at times imperceptible, and the mouth and nostrils covered with froth of a strawberry color. He had three convulsions in about thirty minutes, the last one of longer duration than the others, and soon died. The root was planted, and when grown was identified as the *Cicuta maculata*, or water-parsnip.—*Pædiatrics*, 1896, No. 3, p. 102.

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#### SULPHONAL IN ENURESIS.

DR. J. MADISON TAYLOR recommends this drug to be taken at night, in a large dose—6 to 10 grains—and as well in smaller doses—2 to 4 grains—during the day. Believing that instability of the nervous equilibrium is the essential factor, and some one of the various reflex irritants the supplemental cause, he concludes that enuresis does not take place in an entirely healthy child.—*Pædiatrics*, 1896, No. 4, p. 163.

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#### NEW METHODS IN TREATMENT OF MALARIAL FEVERS IN INFANCY.

DR. MONCORVO has used phenoclol hydrochloride in doses of from five to thirty grains each twenty-four hours, generally administered in solution, in fifty-five cases. It has generally been well tolerated, and rendered good service in several cases in which it was difficult or impossible to administer quinine, but it cannot be said to possess any advantage over quinine in pernicious fevers. In mild cases it is useful and safe even when the kidneys are somewhat diseased. Asaprol has been easy of administration on account of its solubility, its slightly bitter taste being concealed by an aromatic syrup, as that of peppermint, and it does not give rise to any outward symptoms. It can be used in doses of from five to forty-five grains *per diem*. Eighteen cases are cited, and in but one case did it fail, and that was also tuberculous, and further complicated by severe broncho-pneumonia. In this case the fever resisted also antipyrine and quinine. In a child who suffered from malaria and chorea both conditions were relieved by a daily dosage of seventy-five grains.—*Gazette hebdomadaire de Médecine et de Chirurgie*, 1895, No. 50, p. 590.

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#### ANTIPYRINE FOR CONJUNCTIVITIS.

DR. A. E. ANDERSON desires to call attention to the value of this drug as a remedy for conjunctivitis, acute, chronic, and granular. He uses a 10 per cent. solution, applying this to the tarsal conjunctiva with a pledget of cotton, taking special care to push the cotton well up into the retrotarsal fold. Then follow a momentary sensation of pain and a gritty sensation, causing the patient to blink, which soon disappears. For use at home thrice daily, a 4 per cent. solution may be ordered.—*Therapeutic Gazette*, 1895, No. 12, p. 863.

## MEDICINE.

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UNDER THE CHARGE OF

WILLIAM OSLER, M.D.,

PROFESSOR OF MEDICINE IN THE JOHNS HOPKINS UNIVERSITY, BALTIMORE, MARYLAND;

AND

GEORGE DOCK, M.D.,

PROFESSOR OF MEDICINE IN THE UNIVERSITY OF MICHIGAN.

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### A LITTLE-KNOWN OCCUPATION-NEUROSIS.

BERNHARDT (*Neurolog. Centralblatt*, No. 1, 1896) calls attention to a painful condition affecting especially the region of the external epicondyle of the humerus and occasionally the head of the radius. There are no objective symptoms, but the patients complain of pain beginning in the location mentioned and sometimes extending down the forearm to the wrist, or even to the fingers. The pain is increased by various motions, such as closing the hand, extending it, grasping tools, or even by holding a pen, and so interferes with various occupations. At rest the pain is slight or absent. There is no paralysis, no alteration of electric excitability, and no trophic lesion, nor is the general health affected. Of thirty cases carefully studied twenty-seven affected men, three women. With one exception all the patients were above the age of thirty. Various occupations were represented, and in almost all cases overexertion, especially of the affected arm, was alleged by the patients. In three cases there was a history of traumatism. In twenty cases the right arm alone was affected. In connection with the history of overexertion the author calls attention to the numerous important muscles attached to the points especially involved, the excessive use of which might easily cause irritation of the periosteum. In two cases the internal epicondyle was sensitive. The course of the disease is often chronic, but the prognosis good. Rest is essential in the treatment. In severe cases leeching is beneficial, and may be followed by wet packs, and later by applications of iodine.

The condition is mentioned by Remak in his article on "Occupation-neuroses," in Eulenburg's *Encyclopædia*. Bernhardt thinks that "cold" may cause a similar condition, though overexertion is the principal factor.

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### ASPERGILLAR PSEUDO-TUBERCULOSIS.

RÉNON reports two cases of this rare and interesting disease, which has, up to the present, been regarded as a professional affection attacking pigeon-feeders.

Rénon's cases, however, occurred in a man and his wife who were occupied in combing and sorting hair. The hair if dry was combed in this condition, but if moist was first sprinkled with rye-flour to prevent kinking and breaking. The use of this flour gave rise to a good deal of dust.



The wife, after having worked for seven years, was taken with frequent hæmoptysis, and had the signs of a tubercular lesion in the first stage in the left lung.

The husband was taken nine years after beginning the occupation with violent attacks of hæmoptysis lasting over a period of eighteen months, and showed signs of a healing cavity in the left lung with a generalized bronchitis.

In neither case did the sputum show tubercle-bacilli, and six guinea-pigs inoculated with it (three from each case) were killed after forty-two days, and showed absolutely no lesions of tuberculosis. On the contrary, much mycelium was found in specimens of the sputum appropriately stained, and culture-experiments showed the *aspergillus fumigatus* to be present. Animals inoculated with these cultures promptly succumbed with typical aspergillar lesions, and the organism was again recovered from their organs. The dust from the room and the rye-flour inoculated upon suitable media showed the presence of the *aspergillus fumigatus*, the hair itself being free from it.

It was noticed that dogs and birds were unable to live in the workshop, the former succumbing after some months, the latter after a few weeks, after showing emaciation and coughing a good deal.

Out of six pigeons which were subjected to inhalations of the dust from the affected room, five died with lesions of aspergillus-infection, the sixth recovering, but showing at autopsy healed lesions.

The author concludes that the infection in these cases came from the dust of the room, more particularly that from the flour.

Rénon thinks that millers and all workers with grain are liable to contract this disease, and cites the fact that aspergillar keratitis has been found in millers.—*Comptes Rendus de la Société de Biologie*, November 1, 1895.

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#### RELAPSE IN PNEUMONIA.

RUGE describes the peculiarities of relapse in croupous pneumonia, based on a study of two cases under his observation, and seven reported by others. Between the two attacks there is an afebrile period of from four to fifteen days. During this time the subjective sensations are those of convalescence. The physical signs disappear, at least partially. The duration of the relapse varies from four to eight days. The part of the lung affected is usually the same as in the first attack. Such cases differ from wandering pneumonia, as Ruge showed by an analysis of eighteen cases, by the longer course of the latter. Transition-forms no doubt occur. The frequency of relapse in pneumonia is stated by various authors as from 0.18 to 0.45 per cent.—*Charité Annalen.*, 1895, p. 184.

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#### ON THE ANATOMIC CHANGES IN HUNTINGTON'S CHOREA.

KRONTHAL and KALISCHER (*Virchow's Archiv*, Bd. 139, H. 2) report a second case of hereditary chorea with autopsy. The changes resembled those in their former case. (*Neurologisches Centralblatt*, 1892, Nos. 19, 20.) There were alterations of the pia; atrophy of the convolutions; thickening and degeneration of the vessels of the cortex; increase of nuclei or small-cell infiltration of the cortex; alterations of the ganglion-cells of the brain

and cord and diffuse degeneration of the white matter of the cord. In the previous case adhesions of the pia and cortex, cavities, minute hemorrhages, and sclerosis of the gray matter of the brain predominated; in this one small collection of round- and spindle-cells in the cortex and subcortical layer were numerous. Fully realizing the difficulty of distinguishing secondary from primary changes in this disease the authors come to the conclusion that the primary seat of the changes which cause the choreic movements is in the cortex, consisting essentially in vascular disease, cellular infiltration, increase of nuclei, small hemorrhages, and increase of the glia and the interstitial connective tissue. The actual cause of these changes remains unexplained.

#### ACUTE LEUKÆMIA.

An important contribution to the study of leukæmia is made by A. FRAENKEL (*Deutsche med. Wochenschrift*, 1895, Nos. 39-43, and 45). He had the unusual experience of seeing ten cases of this disease within a short time. Six of the patients were males, four females. Four were between thirteen and eighteen years of age, six between twenty-four and thirty-four years of age. The duration of the disease varied from twenty days to sixteen weeks. Even in the cases of comparatively long duration the onset was sudden and similar to that in the more rapid ones. Hemorrhagic diathesis was an early feature. In eight cases in which examinations of the blood were made a striking similarity was found, the condition being quite different from that in chronic leukæmia. The leukæmic character of the blood was found to be due to a great increase of mononuclear cells of various sizes, but having the structure and the staining-peculiarities of lymphocytes. The larger of these have large nuclei, almost filling the body, sometimes irregular in shape, or in various stages of division. They do not stain deeply. Eosinophile and neutrophile myelocytes were not present, but basophile granulations occurred. The number of polynuclear cells was extremely small. In three cases mitoses were found, but not in all parts of the capillary system, so that Fraenkel believes that this process may occur in certain parts in which the conditions are favorable, perhaps on account of slowing of the current, as suggested by Troje. Nucleated red corpuscles were usually rare. Preparations from various organs show that the mononuclear cells are formed especially, but not exclusively, in the lymph-glands. There is lymphæmia in the wide sense; the young forms of cells do not pass on into the more mature forms. The proliferation of the lymphocytes must take place with great activity and they must soon enter the circulation, hence the clinical picture.

From the similarity of the symptoms and the condition of the blood a single etiological factor would seem probable in all the cases. The course seems to point to an infection. In two cases the absence of bacteria in the blood was demonstrated. The possibility of infection from the alimentary canal must be remembered, however, and Fraenkel shows that the early and constant implication of the cervical lymphatics suggests an invasion from the mouth or pharynx.

In two of the cases an intercurrent bacterial infection was followed by rapid decrease of the number of leucocytes, without an increase of poly-

nuclear forms. This has also been observed by others, and Fraenkel alludes to the possibility of using such observations in devising treatment.

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SUDDEN DEATH FROM EMBOLISM OF BOTH CORONARY ARTERIES.

At a recent meeting of the Berlin Verein für innere Medicin OESTREICH demonstrated the heart of a thirty-two-year-old man, who died in coition on his wedding night. Just above the right aortic valve was a pediculated mixed thrombus, doubtless originating in an atheromatous ulcer. In both coronary arteries were emboli, evidently derived from the large thrombus, as the coronary arteries themselves were not atheromatous. The probable cause of the atheroma at the comparatively early age of the patient is not mentioned.—*Centralblatt für innere Med.*, 1896, No. 2, p. 55.

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SODIUM SALICYLATE AND THE FORMATION AND EXCRETION OF URIC ACID.

The practice of giving salicylates to increase the excretion of uric acid, urged by Haig and others, seems to require a revision on the ground of certain observations of BOHLAND (*Centralblatt für innere Med.*, 1896, No. 3). The latter found that although the administration of salicylic acid is in fact followed by an increase in the excretion of uric acid, there is also a marked increase in the number of leucocytes. According to the theory of Horbaczewski, confirmed by some others, the increased excretion of uric acid in these cases could be explained by the increase of leucocytes and their subsequent break-down. According to Neusser, in gout and the uric acid diathesis in general the leucocytes are increased; and if this is exaggerated by the administration of salicylic acid, there is risk of aggravating the local symptoms in the joints, as well as augmenting the size of concretions which may be present.

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IODINE IN THE THYROID GLAND.

One of the most interesting discoveries in physiological chemistry is that recently made by BAUMANN, who found iodine in the thyroid gland. This occurs in close combination with a complex body which gives no albumin-reactions, but contains phosphoric acid in small quantities, and is perhaps a derivative of nucleic acid. To the iodine-combination the name thyriodin is given by the manufacturing chemists who make it after Baumann's method. Iodine exists in the newly isolated body in considerable proportions: in one preparation 2.9 per cent.; in another, further purified, 9.3 per cent. The actual proportion is about one milligramme of iodine to a gramme of dried gland. The preparation was obtained from sheep-thyroid, but the human thyroid was shown to contain the same or a very similar body. Iodine was also found in the thyroid glands of hogs, but not in that of cattle. In a colloid goitre (preserved for a long time in alcohol) the amount of iodine was very small.

The discovery is, of course, of great interest in connection with the treatment of goitre and seems to go far toward explaining the action both of iodine and of thyroid preparations. The superior activity of thyroid over



iodine in many cases might be explained, as Baumann says, by the fact that the latter serves to assist in the formation of the necessary substance which in the gland is already present.

Acting on a suggestion of Kocher, Tschirsch tried to find iodine in the thyroid gland, but was unsuccessful by reason of a faulty method. Baumann points out the great importance of the discovery in physiology and in organo-therapy. Further particulars are promised by the author and his pupil Roos.—*Zeitschrift für Phys. Chem.*, Bd. xxi., Heft 4.

Treupel has used thyroiodin in a case of sarcoma of the pelvis with metastases in the thyroid. The preparation was given at first with the idea of differentiating between primary struma and other possible causes of enlargement of the thyroid, but the case furnished interesting material for studying the effect of the preparation on metabolism. The amount of thyroiodin given in one day corresponded to one gramme of the fresh gland. No alteration of the temperature was observed, the pulse became slightly irregular, and palpitation of the heart occurred. The most important effect was an increase of the amount of urine excreted, and a decided increase in the excretion of urea. As the author shows by a careful analysis of the literature the experiment proves that the action of thyroiodin is identical with that of the gland itself.—*Münchener med. Wochenschrift*, 1896, No. 6.

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#### ICTERUS FROM LACTOPHENIN-INTOXICATION.

WENZEL (*Centralblatt für inn. Med.*, 1896, No. 6) reports the case of a man of thirty-four years, who had become a morphinist in consequence of neuralgia. In the effort to overcome the habit various sedatives were used. Among these lactophenin was given in the dose of one gramme daily. For two weeks this was well borne, though without lessening the neuralgic pains. There were no symptoms on the part of the alimentary tract. Suddenly intense jaundice appeared, the stools became acholic, the urine dark, with yellow foam and bile-coloring reaction. There was no pruritus, no slowing of the pulse, no fever. The stools were clay-colored for about ten days, and then gradually assumed the normal appearance. The other symptoms lasted several weeks. At the height of the disease nausea and vomiting occurred, but were not severe. The appetite was hardly affected at any stage. Wenzel attributes the icterus to the action on the red blood-corpuscles of paramidophenol, the useful but at the same time toxic element of lactophenin, as also of many other recently discovered analgesics and antipyretics.

STRAUSS (*AMERICAN JOURNAL OF THE MEDICAL SCIENCES*, March, 1896, p. 341) had previously reported three cases of poisoning from lactophenin with symptoms similar to those in Wenzel's case, but in the former enormous quantities of the drug had been taken, *i. e.*, 36, 56, and 84 grammes respectively. The influence of idiosyncrasy in such cases is perhaps very important.

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#### AN UNUSUAL CASE OF ASCITES.

PÜTZ (*Deutsche med. Wochenschrift*, Beilage 5, p. 35, February 20, 1896) reports the case of a man of sixty-two years, healthy up to 1890, who, after the usual early symptoms of cirrhosis of the liver, developed ascites in

March, 1891. He was tapped the first time April 3, 1891, nine litres of ascitic fluid removed, and improved very much, so that a second tapping was not necessary until the end of January, 1892. A third operation was made in the following May. After that the intervals became shorter, so that toward the last fluid had to be removed every nine or ten days. Death occurred four days after the forty-seventh tapping. The duration of the disease is not stated, but would appear to have been about four years. In this time 1186 litres by measure, or in round numbers, including the fluid which trickled from the wound, 1200 litres of fluid were removed, or about seven times the weight of the patient.

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## SURGERY.

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UNDER THE CHARGE OF

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### RADICAL OPERATION OF REDUCIBLE HERNIÆ.

GREIFFENHAGEN (*St. Petersb. med. Woch.*, December 28, 1895), after discussing the position of this operation at the present day, says the mortality of non-incarcerated herniæ that are not complicated by the resection of intestine or mesentery is rapidly decreasing, until at the present day the mortality is practically nil and all patients, or nearly all, recover. For instance, Macewen reports 82, Kocher 220, Bassini 239, Boca 250 cases, in which no death occurred. This shows that the radical operation for non-strangulated herniæ is at the present time a harmless operation.

That, however, is not sufficient. What are the permanent results? Especially of inguinal herniæ, do they show permanent cures?

The percentage of relapse, as given by known authorities of their operations, is the following: Schede, 10 per cent.; Kocher, 8.6 per cent.; Kuster, 6 per cent.; Wolfier, 5 per cent.; Bassini, 3 per cent.; Macewen, 0.6 per cent.; and Kocher, by his latest method, 0 per cent., or 100 per cent. of permanent cures. Of course, the observation of these cases has only been for a limited length of time in some cases, but the two things necessary for the success of the operation are however established—its harmlessness and the certainty of a radical, permanent cure.

The present status of the operation has entirely altered the indications for operation. It should be performed in all cases of herniæ that cannot be re-

placed or are difficult to retain by a truss, and that have shown a tendency to inflammation.

Further, the operation is indicated in the following conditions :

1. In all free herniæ that are difficult to retain or are only partially retained by a truss and where the truss cannot be worn comfortably.
2. In middle-aged and young persons of the working-classes, who cannot afford to buy a good truss and renew it when necessary.
3. In children, and especially in large herniæ.
4. Finally, patients should be operated upon if they so desire and wish to be free from the inconvenience attending the wearing of a truss.

The contraindications are a hernia so large that it cannot be returned into the abdominal cavity, and systemic conditions that contraindicate all forms of operation.

The best results are obtained in small, free, relatively recent herniæ in young persons, in which there have been no adhesions formed and there is not much motion. The greater the amount of adhesion between the sac of the hernia and the canal the more difficult is the technique and the less are the chances of a permanent cure.

The author is divided in his opinion as to the best operation, preferring, according to the case, Macewen's, Kocher's, Bassini's, and Frank's methods.

#### FIVE UNUSUAL CASES OF ABSCESS IN CONNECTION WITH THE VERMIFORM APPENDIX.

WHITE (*The Practitioner*, November, 1895) reports five cases, the first four of which illustrate the fact that we should always bear in mind that any suppuration within a radius of six inches from the cæcum may arise from disease of the appendix. One of the cases, in which the abscess presented just above Poupart's ligament on the left, illustrated this, as the abscess was found to arise from the appendix. The author also mentions a post-mortem case, in which the abscess, pointing through the right saphenous opening, was found to be connected with the appendix. The fourth case shows that many instances of right-sided perineal abscess owe their origin to the appendix. This has also been demonstrated to the author post mortem. Operative interference was easy in the case reported, in two of the other cases an exploratory laparotomy led to the rupture of the abscess into the general peritoneal cavity, while the other case got well without operation.

The author directs attention to the fact that often in these cases the temperature is but little raised.

In two of the cases reported the liver suffered. In the first the abscess came in contact with the superior mesenteric vein, and caused thrombosis with resulting multiple secondary abscesses in the liver. The author believes that it is excessively rare for this to happen. In the other case there was a single large abscess in the liver in association with an abscess in connection with the appendix. This is described, but it, too, is very uncommon.

#### THE STREPTOCOCCUS AND ANTISTREPTOCOCCIC SERUM.

MARMOREK (*Annales de l'Int. Pasteur*, November 7, 1895; *Cent. für innere Med.*, December 28, 1895), working in the same line as the diphtheria- and



tetanus-serum theories, produced an anti-streptococcic serum which gave the following results in cases of erysipelas :

The mortality before its use was 5.12 per cent. During the period it was used there were 306 cases, 165 of these that were considered severe were injected ; the mortality fell to 1.63 per cent., and if certain cases were left out that died from other causes it would be only 1.2 per cent. A weaker serum was then employed, when the mortality rose to 4.82 per cent.

If the dose was sufficient, improvement in the subjective and local symptoms took place five to twelve hours after the injection. The temperature sank rapidly, and came to normal twenty-four hours afterward. If the temperature remained high, the dose was repeated at the end of twenty-four hours.

Albuminuria was never present in patients treated with the serum, and if it was previously present, it disappeared from twenty-four to forty-eight hours after the treatment commenced.

The dose varied according to the patient and the severity of the disease from 10 c.c. to 20 c.c. in severe cases. The total dose never exceeded 120 c.c. in ten days.

Gratifying results were also obtained in cases of puerperal fever, especially where the infection was not mixed, but a pure streptococcus infection.

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#### THE TREATMENT OF INFECTIOUS ANGIOCHOLITIS AND CHOLECYSTITIS.

F. TERRIER (*Rev. de Chir.*, December, 1895) gives the following as a *résumé* of his method of treatment in these cases :

1. Where the biliary passages are involved either directly or indirectly in an inflammatory process, either with or without the presence of calculi, which results in a febrile condition that is intense, either continuously or with marked exacerbations, there is an absolute indication for surgical interference—that is, for a laparotomy.

2. This operation should have for its end the opening of the gall-bladder and the formation of a permanent biliary fistula—that is, a cholecystotomy should be performed.

3. By this operation information of the exact condition of the biliary canals is obtained, including the cystic and vesicular ducts and the ductus choledochus, while complete drainage is furnished for the septic bile which fills the ducts and poisons the system.

4. This form of drainage provides in a manner that is indirect and mechanical for the issue of the septic bile and thus for a disinfection of the bile-ducts, which is much better than the pretended medical treatment so often employed.

## OPHTHALMOLOGY.

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## ABNORMAL ASSOCIATED MOVEMENTS OF THE EYELIDS.

W. W. SINCLAIR (Ipswich, Eng.) reports new cases, and collects cases previously reported, making a total of forty (*Ophthalmic Review*, No. 168). These he has analyzed and classified in three series. The *first series* includes thirty-two cases in which certain movements of the lower jaw were associated with an upward movement of the upper eyelid. This series is subdivided into four groups. The first group is of cases of one-sided congenital ptosis, in which the drooping eyelid was raised both when the mouth was opened (by the digastric?) and also when the jaw was directed to the opposite side (by the external pterygoid). The second group is of those cases of one-sided congenital ptosis in which the eyelid was raised when the jaw was depressed, but not when it was moved laterally. In the third group are placed those cases in which the drooping eyelid was raised with lateral movement of the jaw, but not with simple opening of the mouth. Group four includes cases in which associated movements of the upper lid occurred, with movements of the jaw; but in which there is no ptosis. In some of the fourth group ptosis developed later. Up to the present no case has been examined post mortem, and in the present state of our knowledge, Sinclair thinks, some abnormal anatomical connection between the levator muscle and parts of the fifth-nerve nucleus is the simplest explanation of this association of movement.

In the *second series*, of four cases, contraction of the levator of the upper lid was associated with contraction of the internal rectus. Turning the eye in was associated with an elevation of the lid. This was bilateral in all but one of the cases. It might be explained by an unusually close connection between the two third-nerve nuclei.

The *third series* includes five cases collected from the experience of London ophthalmic surgeons, and differing from any cases previously published. They are cases of paralysis or paresis of one external rectus, in which movement inwards of the affected eye was associated with contraction of the orbicularis muscle and retraction of the globe. In one case the enophthalmos was permanent. For this series of cases Sinclair finds no satisfactory explanation, and he thinks they will probably not be correctly explained until the opportunity for a post-mortem examination occurs. In the third series it was the left eye which was affected in every case. In the first series the preponderance of cases in which the left eye was affected was as  $2\frac{1}{2}$  to 1.

The first case of these abnormal associated movements appears to have been recorded by Gunn in 1883; but Sinclair believes that such cases are comparatively common, and that many instances have been met with which were merely regarded as curiosities, and not put on record.

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#### PARESIS OF THE OCULAR BRANCH OF THE SYMPATHETIC.

PANAS (Paris) calls attention (*La Presse Médicale*, 1895, No. 64) to this condition, which is liable to be confounded with ptosis due to lack of power in the levator of the upper lid; whereas the weakness is really manifested in the action of the unstriated fibres of Muller and Sappey. The ptosis from paresis of the sympathetic is distinguished from ptosis due to other causes by the coexistence of a contraction of the pupil on the affected side. This contraction is due to weakness of the dilator of the pupil ("internal dilator") similar to the weakness of what Panas styles the "external dilator" or dilator of the palpebral opening. The pupil is free from adhesions and reacts to light and with convergence, but its contraction may not be entirely regular. In severe cases there will also be unilateral flushing of the face, especially when the patient is very warm or subjected to strong emotion.

The prognosis is rather grave, in that the vascular conditions tend to weaken; yet the ocular paresis may remain unchanged after many years. The treatment recommended by Panas consists of the application of electricity to the surface of the lid and over the course of the cervical sympathetic of the affected side, and a tonic regimen. One can try the hypodermic injection of strychnine in the temple. The weakness may be masked for a brief time by the stimulating effects to the fibres involved of local applications of cocaine.

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#### CONGENITAL NIGHT-BLINDNESS.

The atypical cases of *retinitis pigmentosa*, as those without the characteristic pigment-deposits, those following acquired syphilis, or those occurring in connection with choroiditis, are so numerous and so varied in their character that it has been easy to group with them conditions which will probably be proven essentially different. One of these conditions has recently been studied by C. W. Cutler, in the clinic of Prof. Fuchs (Vienna), who reports five cases occurring in two families, and gives (*Archives of Ophthalmology*, vol. xxiv., No. 3) a *résumé* of previously reported cases, including records of ten families and two isolated cases, making in all fifty-four cases. To these must be added two cases reported, with references to others, by W. T. Atwood (Torbay, Eng.), in *Royal Lond. Ophthal. Hosp. Rep.*, vol. xiv., part i.

The condition is characterized by the following features, which sharply differentiate it from retinitis pigmentosa: Night-blindness is congenital, and remains entirely unchanged throughout life. The ophthalmoscopic appearances are normal. Cutler notes that in one case the retinal arteries were distinctly narrow. Nettleship described white spots at the macula in some of his cases, and slight or moderate conus has been noted in several cases; but these changes are manifestly accidental as regards the condition in question.



The field of vision for white is normal, or at least not materially contracted. The fields for colors are not greatly contracted. That for red is nearly or quite normal. The fields for yellow and blue are almost identical, and may lie within the field for red. This reversal of fields may disappear under diminished illumination. Central color-perception is normal.

The condition is hereditary, more markedly so than retinitis pigmentosa. In two families it was traced through five generations. In two families it was confined to males, being transmitted through normal females to their sons, like congenital color-blindness; but in the other families both males and females were affected.

The impairment of vision by diminished illumination is very marked. Some of the cases could not venture out of the house alone after nightfall. The father of Atwool's cases, a naval officer, had accidentally walked off the bridge at night on more than one occasion. In Cutler's cases the light-sense tested by Foerster's photometer varied from  $1/25$  to  $1/49$ , and was unchanged after one hour's adaptation. Cutler points out that the frequent coincidence of night-blindness and blue-blindness is suggestive; but that it would be rash to conclude from this that they are intimately related.

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#### HYDRAULIC CURETTING OF THE CORNEA.

Under this peculiar title SANTARNECCHI (Cairo) advocates (*Annales d'Oculistique*, vol. cxiv., No. 3) the forcible washing out of corneal ulcers and abscess-cavities. He holds that the complete incision proposed by Saemisch may be very useful in limited vascular ulcers, and may be employed with advantage when an abscess has opened into the anterior chamber; but it is contraindicated for large atonic ulcers, and should be discarded if the abscess opens externally or is not completely open. The actual cautery for the treatment of these conditions he thinks destined to be relegated to the domain of history.

The method put forward is, after instilling cocaine, to attack the surface of the ulcers, or walls of the ulcerated or carefully opened abscess, with a jet of water, applying it over the whole surface, and progressively increasing its violence until the last portion of adherent ulcerated tissue is removed. After this the eye is covered with a protective bandage. To furnish the jet he employs an Anel syringe, the only fault of this instrument being that it does not contain a sufficient quantity of fluid for complete cleansing.

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#### DESCENDING OPTIC NEURITIS CONSEQUENT UPON NASAL TREATMENT.

Temporary amblyopia and narrowing of the field of vision, apparently reflex or combined with hyperæmia of the eyeball, following the application of the galvano-cautery to the nasal mucous membrane, have been reported by a number of observers. A. Alt (St. Louis) reports (*Amer. Journ. of Ophthalmol.*, vol. xii., No. 9) a case of a somewhat different and more serious nature.

A man, aged thirty-eight years, had been treated for nasal catarrh and narrowing of the left nasal passage by means of different applications and the galvano-cautery. He noticed the left eye did not see so well as usual, and mentioned it to his physician. Treatment was persisted in, and two

days later he awoke to find the eye blind. When seen that day by Alt there was doubtful perception of light, the pupil was dilated and scarcely reacting. The margins of the optic papilla were almost invisible, the retinal veins were hyperæmic, the arteries thin. Tension was normal.

The nasal treatment was stopped. On the third day the patient counted fingers at one foot, and on the sixth day at five feet, with considerable increase of the field. A few days later injections of strychnine were commenced, and by the eighteenth day he had regained vision = 20/xxx+, the field being still somewhat narrowed except upward and outward. The arteries were still thin, and papilla almost white.

Afterward Dr. Alt learned that the patient had had syphilis, and he thinks that to this was in some measure due the severity of the attack; but that it could only be accused of being an indirect cause of the trouble by rendering the patient more vulnerable, since only the eye on the affected side was involved, and it improved promptly on mere cessation of the nasal treatment.

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#### PREVALENCE OF TRACHOMA.

From an extended study of the statistics of trachoma and correspondence with ophthalmic surgeons in all parts of the world, VAN MILLINGEN (Constantinople) has reached the following conclusions (*Annal. d'Oculistique*, vol. cxiv., No. 3):

1. Trachoma is an infectious and contagious disease, which predominates in uncivilized countries and tends to disappear with the progress of civilization and hygiene. Hygiene and cleanliness are the best preservatives against trachoma.

2. Trachoma is not influenced by altitude; it may spread wherever the people are uncleanly and live in poverty quite as easily at altitudes of 1000 to 5000 metres as on plains.

3. All races are equally susceptible to the virus of trachoma. An immunity for certain races does not exist.

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#### TREATMENT OF OCULAR SYPHILIS BY MERCURY, POTASSIUM IODIDE, AND PILOCARPIN.

G. H. BURNHAM (Toronto) reports (*Archives of Ophthalmol.*, vol. xxiv., No. 3) greatly increased efficiency in the treatment of syphilis of the eye by the addition of pilocarpine to the ordinary mixed treatment. The pilocarpine was given hypodermically in doses of one-eighth to one-fourth grain daily, unless its administration gave rise to nausea, headaches, or oppression over the heart, when it was stopped for a day or two. This was continued two or three weeks, then intermitted, the mercury and potassium iodide being continued through the interval.

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#### RELAXATION OF THE SKIN OF THE LIDS.

Under the name of *Blepharochalasis*, FUCHS (Vienna) gives an account (*Wiener klin. Wochens.*, ix. Jahr., No. 7) of a condition which he finds nowhere accurately described in ophthalmic literature. The affection is

seen in young and middle-aged persons, although the condition of the skin comes to resemble that of senile relaxation and atrophy. The change is confined exclusively to the upper lid, and mainly to the part above the tarsal cartilage. There are repeated attacks of oedematous swelling of the part which at such times hangs down toward the lid-margin like a bag, pale, and as though filled with water. After these attacks the skin feels extremely thin and presents premature grayness, or there may be redness from numerous small distended veins.

The disease is essentially an atrophy of the skin with thinning and loss of elasticity, followed by stretching and atrophy of the subcutaneous tissue. It is comparable with the changes produced in the skin by distention from pregnancy or dropsy. The treatment must be by an operation removing a portion of the relaxed tissue. Fuchs has found that the injection of tincture of iodine or strong alcohol into the subcutaneous cellular tissue of the part, to produce inflammation and subsequent cicatricial contraction, has been followed by little benefit.

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#### OPERATIVE TREATMENT OF ENTROPION AND TRICHLIASIS.

J. B. STORY (Dublin) holds that a good operation will not leave the result at the mercy of the subsequent stretching or further contraction of cicatricial bands; will entail no unnecessary removal of tissue; will not produce an ugly scar; and will not, if it happens to fail, render the patient's condition worse by making a second operation more difficult. He describes (*Ophthalmic Review*, vol. xiv., No. 170) the operation employed in nearly four hundred cases, with results "almost uniformly perfect."

An intermarginal incision is made along the whole border of the lid or beyond the part affected, all the cilia being included in the upper lip of the incision. This should be deep enough to allow the wound to gape easily about 3 mm. A strip of mucous membrane is then dissected from the lip, as long as the incision, and 2 or 3 mm. wide. From this strip all fat is removed. A suture with a large knot on it is drawn through one end of the strip from its external surface, and the needle passed into one end of the intermarginal cut and brought out through the skin of the lid at some distance—say 8 mm.—from the lid-border. The suture is then tied, care being taken to pull the strip well into the incision, and to leave an interval between where the suture comes out of the skin and the suture-knot to facilitate removal. The other end of the strip is similarly secured in the other end of the incision; and a third suture may be placed in the middle of the strip; although if the strip is stretched pretty tightly between the end-sutures, the third is not necessary.

For the same purpose F. C. Horz (Chicago) prefers to take (*Jour. Am. Med. Assoc.*, vol. xxv., No. 16) a narrow strip of skin from behind the ear. This is made by an incision as long as the required graft and 1 mm. deep, and a second incision chiefly parallel to it 1.5 or 2 mm. distant from it, but joining the first at the ends and so inclined as also to meet the first at the proper depth throughout its length. The firm wedge-shaped graft thus obtained is trimmed, if necessary, to fit the incision, and pressed firmly into it.

The surface of the graft should be even with, or a little below, the edges of the wound; should never protrude beyond them. No suture is required



to hold this in place, and it only needs to be bandaged for twenty-four hours; after which it should be well lubricated with vaseline until in about two weeks it becomes smooth and scarcely distinguishable from the rest of the lid-border.

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#### MIGRATION OF SUBHYALOID HEMORRHAGE.

H. FRIEDENWALD (Baltimore) reports (in the *Trans. of the Section on Ophthalmology of the Amer. Med. Assoc.*, 1895) a case of manifest disease of the retinal vessels, with repeated hemorrhages, subhyaloid, and into the vitreous. A large subhyaloid hemorrhage occurred in the upper part of the fundus. The next day it seemed to have changed position and an accurate drawing was made of it. Two days later it had migrated to a lower point and was lying directly over the macular reflex, and its lower edge was slightly concave and corresponded with the convexity of the upper margin of this reflex. Four days after this a small part of the hemorrhage remained at the upper margin of the macular, but the greater part had passed to the temporal side of the macular and beneath it, while between the two parts stretched a hemorrhagic line passing to the outer side of the macular and concave toward it. After this the bulk of the hemorrhage sank a little lower, and two weeks later it was principally absorbed.

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#### SCOPOLAMIN HYDROCHLORATE AS A CYCLOPLEGIC.

T. E. MURRELL (St. Louis) has employed this drug for the purpose of paralyzing the accommodation for the measurement of ametropia, and is confident that so far it is the best cycloplegic that we have. He has employed it in fifty-seven cases (*Annals of Ophthalmology and Otology*, vol. iv., No. 4) in a solution of 1:1000, making two instillations at an interval of fifteen minutes, and has never had any evidence of a want of total suspension of the accommodation at the end of an hour from the first application. From such a use of the drug he has seen no systemic poisoning or local irritation. The accommodation is regained sufficiently to read in about seventy-two hours.

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#### FORMALIN IN OPHTHALMIC PRACTICE.

SWAN M. BURNETT (Washington) calls attention (*Ophthalmic Record*, vol. v., No. 9) to the therapeutic value of this drug in ophthalmic medicine and surgery. It is a germicide of great power, it has little if any toxic properties, and it has the power of diffusing itself rapidly through the tissues. The latter quality gives it a great advantage over mercuric chloride, which by its coagulative action greatly limits its sphere of efficiency.

Burnett has obtained excellent results from its use in infecting ulcers of the cornea and purulent conjunctivitis. Corneal ulcers may be touched with a solution of 1 to 200 or 1 to 500 every day. For general use as an antiseptic collyrium a strength of 1 to 1000 or 1 to 2000 may be employed, although the stronger of these sometimes causes a slight burning sensation. For the disinfection of instruments and keeping them aseptic it has the advantage of not dulling the edges of knives.

## DIFFUSE SARCOMA OF THE CHOROID.

MITVALSKY (Prague) calls attention to the comparatively rare cases in which sarcoma of the choroid, instead of giving rise to a circumscribed tumor, extends with moderate thickening throughout a considerable part of that membrane, and he reports two cases (*Archives of Ophthalmology*, vol. xxiv., No. 4). He states that sarcoma may involve the entire uveal tract and yet never fill the interior of the eye, but may give rise to episcleral nodules.

In one of his cases a sarcoma with a history of two years' growth, involving the outer posterior portion of the choroid, had attained a thickness of but 1 mm., and the transition to normal choroid was very gradual. In another case arising in the macular region the thickness of but 1.5 mm. had been attained in three years and a half; but several secondary nodules had formed in the anterior portion of the retina. This case had been seen early and the diagnosis made of central choroiditis.

## OYSTER-SHUCKER'S KERATITIS.

R. L. RANDOLPH (Baltimore) has made a clinical and experimental study of the so-called oyster-shucker's keratitis, and reports his results in the *Johns Hopkins Hospital Bulletin*, Nos. 56 and 57. The affection is due to an injury to the cornea from a particle of oyster-shell, and is characterized by the rapidity with which an area of infiltration appears at the site of the wound. It is met with chiefly in the vicinity of Baltimore. This Randolph thinks is because elsewhere they do not follow the practice of striking the shell with a hammer, a practice apparently responsible for the injury. The particle is usually too small and light to penetrate deeply, and can seldom be detected. When it is heavy enough to pass through the cornea the eye is usually lost.

Bacteriological examinations and cultures from sixty-five cases yielded no constant, or generally present, pathogenic micro-organisms. The juice of the oyster mixed with clippings of the shell and filtered injected into the cornea and conjunctiva of the rabbit gave negative results. There were no reasons for supposing the keratitis due to some property peculiar to the oyster-shell of the Chesapeake Bay. Particles of shell sterilized by heat and introduced into the rabbit's cornea invariably produced an ulcer, which did not result from the introduction of other sterilized substances. Experiments with pure carbonate of lime (which constitutes 90 per cent. of the oyster-shell) produced in each instance a keratitis, and Randolph inclines to ascribe to it at least a share in the causation of the affection.

The treatment giving the best results includes: A compress-bandage, a mild sublimate solution, 1 to 4000, used every four hours, and an occasional drop of a 1 per cent. solution of atropin. To this treatment the keratitis promptly responds, and the patient can resume work in a week or ten days. Some opacity of the cornea is permanent.

## STRYCHNINE FOR INSUFFICIENCY OF THE INTERNAL RECTI MUSCLES.

In the *Transactions of the American Ophthalmological Society*, vol. vii., part ii., H. S. OPPENHEIMER (New York) reports twenty-eight cases of

exophorine, which he thinks prove that strychnine sulphate has a specific effect on the interni of the eye, toning them up especially, and far beyond the effect it has on the ocular muscles. The drug was given by the mouth three times daily, beginning with the dose of one-thirtieth of a grain, and increasing the dose gradually until in several cases one-eighth of a grain was taken.

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## OTOLOGY.

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UNDER THE CHARGE OF

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### FOREIGN BODY IN THE EAR.

BÖKE records a case of fatal meningitis, set up by unskilful efforts at removal of a foreign substance from the ear of a child, three and one-half years old.—*Archiv f. Ohrenh.*, Bd. 40, p. 56.

If the average medical man would only remember that a simple substance which a child can slip into the external ear could be syringed out by anybody, how much trouble would be saved! Gentle measures always succeed, and rough ones never, while the latter always do harm and often cause death.

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### OBJECTIVE NOISE IN THE EAR.

TOMKA reports the observations of an objective noise in the ear of a boy of six years, due, he thinks, to the contraction of the tensor veli muscle.—*Archiv f. Ohrenh.*, Bd. 40, p. 57.

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### PRIMARY CARCINOMA OF THE EXTERNAL AUDITORY CANAL.

KREPUSKA records a case of carcinoma of the external auditory canal, which seemed to have originated in chronic eczema. Carcinomatous degeneration occurred partly in the excretory ducts and partly in the acini of the wax-glands, and extended to the terminus of the middle-ear.—*Archiv f. Ohrenh.*, Bd. 40, p. 56.

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### GENERAL CONSTITUTIONAL TREATMENT IN DISEASES OF THE EAR.

GELLÉ presented an exhaustive paper on this subject at the Fifth International Otological Congress, September, 1895.—*Journal of Laryngol., Rhinol., and Otol.*, November, 1895.

He said, among other things, that often the most important information the aurist can give is that the ear is quite normal in appearance, and that the physician must look elsewhere for the cause of constitutional disturbances, though in many cases he could trace them to disease of the organ of hearing.



In acute aural diseases occurring in the course of the eruptive or other fevers careful naso-pharyngeal treatment is recommended for their prevention, in particular Guye's method of naso-irrigation by means of a soda-water siphon-douche, and if necessary the removal of tonsils.

Deaf-muteness, he thought, might be prevented at times by prophylactic specific treatment of the mother during gestation, and by attention to the auditory organ of the infant.

Intestinal antiseptics should be maintained in all cases by means of calomel, naphthol, salol, and other drugs for preventing the multiplication of pathogenic microbes and the occurrence of septic infection. In acute otitis in general he administered sulphate of quinine, but when it arose from influenza he preferred antipyrine, and in gouty otitis the well-tried antiarthritic remedies. He had hopes of advantage accruing from the application of serum-therapeutics in infective diseases of the organ of hearing. In chronic otorrhœa he advocated more frequent recourse to antisyphilitic treatment, and attached great importance to general treatment in gouty, diabetic, and tubercular subjects, believing in a future for serum-treatment in the last. The removal of causes of weakness, such as prolonged lactation, is of urgent importance. The early administration of pilocarpine in sudden deafness was strongly advocated. Hypnotism, though occasionally of value in slight cases of functional deafness, had never proved of value in severe cases, and electricity was of limited value.

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#### MÉNIÈRE'S SYMPTOMS, OR PHENOMENA.

FRANKL-HOCHWART,<sup>1</sup> BARR,<sup>2</sup> and GRUBER<sup>3</sup> have been presenting the old subject of so-called Ménière's disease in a partially new dress. They unite in rejecting the term Ménière's disease as a general one, limiting its use to a particular form of "Ménière's symptom-group." This, however, is not new with them, as most aurists have long occupied this ground in nomenclature of this malady. Recognizing the fact that ear-vertigo (Ménière's symptoms) may be excited by irritation in either of the three divisions of the ear, the outer, middle, and inner, or even in the auditory nerve, we announced fourteen years ago that ear-vertigo should be named according to the seat of the irritation, the term Ménière's disease being reserved for ear-vertigo originating in disease of the internal ear.<sup>4</sup>

Tympanic vertigo is that form originating in tympanic disease, and is the most common form of aural vertigo, or Ménière's symptoms. By dividing the so-called Ménière's phenomena thus according to the seat of the irritation evoking them, they can be rationally considered and treated, and in no other way.

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#### OTITIC FACIAL PARALYSIS.

TRIFILETTI records a case of facial paralysis following inflammation in the ear, which seems to confirm the ideas of Lannois and Gellé that in every

<sup>1</sup> Der Ménièresche Symptomen-Complex, Wien, 1895. Alfred Hölder.

<sup>2</sup> British Medical Journal, December 23, 1895.

<sup>3</sup> Med. Press, London, January 8, 1896.

<sup>4</sup> Philadelphia Medical Times, June 3, 1882.

case of so-called facial paralysis from cold the middle ear will be found simultaneously inflamed, and that this is the real cause of the facial palsy.—*Annales des Mal. de l'Oreille*, January, 1896.

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PASSAGE OF SUPPURATION OF THE MIDDLE EAR TO THE BRAIN BY WAY OF THE CAROTID CANAL.

MEIER calls attention to the above way of infection of the brain from the ear, as already recorded by Koerner and others (*Arch. für Ohrenh.*, Bd. 38, and *Annales des Mal. de l'Oreille*, January, 1896). Inflammations of the brain thus excited do not differ from other forms.

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INVOLUNTARY OPENING OF THE LATERAL SINUS.

CHINCINI reports four cases of involuntary opening of the lateral sinus during operations on the mastoid process (*Annales des Mal. de l'Oreille*, January, 1896). The hemorrhage was stopped by plugging with iodoform-gauze, over which was spread a sublimate-dressing. Recovery ensued in from six to ten weeks.

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SPONTANEOUS RUPTURE OF THE MASTOID CELLS.

BACON records the occurrence of spontaneous rupture of the mastoid cells in a girl two years old (*Annales des Maladies de l'Oreille*, January, 1896). According to our experience, most mastoid abscesses will thus relieve themselves in children and often in adults without any interference on the surgeon's part. If the primary otitis media is not secondarily infected by too much treatment through the external ear, there will be no mastoid sequelæ to contend with.

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ABSCESS IN THE TEMPORAL LOBE.

ZELLER (*Archiv f. Ohrenh.*, vol. 40) reports three cases of the above-named disorder.

1. A child, two and one-half years old, after acute otitis scarlatinosa, presented swelling behind the right ear. Profound opening of this led to an extradural abscess. Four weeks later the first symptoms of brain-abscess appeared: weak voice, loss of appetite, twitching and paralysis of the left facial tract, vomiting, twitching in left arm and leg, and dilatation of the left pupil. Pulse finally reduced to 56. Rupture of abscess into ventricle before an operation was allowed.

2. A boy, thirteen years old, affected with multiple osteomyelitis; pulse 66, temperature normal. Left ear diseased; left eye normal; right pupil the wider. Face drawn toward the left side; right arm and leg paralyzed. Autopsy revealed a fetid abscess in the right temporal lobe, with rupture into the ventricles, and meningitis. Two small perforations in the tegmen tympani.

3. Woman, twenty-two years old, for twelve years the subject of chronic otitis suppurativa in the right ear. Staggering and falling with closed eyes, slight facial paralysis on the left side, and amblyopia. In seven weeks the symptoms grew worse; vomiting; temperature 100 $\frac{2}{3}$ °, and then below normal;

facial and hypoglossal paralysis; apathy; pulse 60 at times. An operation was performed in the middle fossa, and an abscess drained and tamponed. Subsequently sloughing of brain and meningitic symptoms. Death eight days later. Autopsy revealed softening about abscess and œdema of the rest of the temporal lobe, and pachy- and lepto-meningitic suppuration.

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#### SINUS-PHLEBITIS.

BÖKE reports a case of otitic sinus-phlebitis in which the mastoid was at no time sensitive to pressure, but in a line from behind the mastoid downward in the course of the sterno-cleido-mastoid muscle, as far as the clavicle, the lightest touch caused great pain. The jugular was distinctly felt, being as thick as the little finger. The autopsy revealed on the under surface of the right cerebellum a small abscess filled with brownish-gray pus, around which the white substance was softened. The tegmen tympani was intact, but the inner wall of the sigmoid fossa near the jugular foramen was eroded and perforated, the right sigmoid sinus partly destroyed and partly filled with broken-down brownish-red thrombi. Similar changes had occurred in the internal jugular vein. There were metastatic abscesses of the lungs, necrosis of the pleura, suppurative pleuritis on both sides, and parenchymatous degenerations of the liver and kidneys.—Hungarian Otol. Society, *Archiv f. Ohrenh.*, Bd. 40, p. 55.

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### DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

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UNDER THE CHARGE OF

J. SOLIS-COHEN, M.D.,  
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#### ABSCESS OF THE TONSIL.

In an article on the etiology of abscess in the tonsil and the surrounding connective tissue DR. KOEHLER, of Posen (*Deut. med. Woch.*, 1896, No. 7), reports, among others, one source which, it is believed, has been hitherto undescribed, namely, a chronic suppurative inflammation of the middle ear.

A well-nourished servant-girl, twenty-five years of age, came to Dr. Koehler June 26, 1895, complaining that she had an ulcer in the right tonsil again; and she stated that for a number of years such ulcers had recurred at intervals of from four to six weeks, and had continued even after an operation for removal of the greater portion of the tonsil. Examination showed an abscess in the substance of the right tonsil, which was at once opened. The left tonsil was free from plugs, the teeth were very sound, and there was no disease in the nasal passages. The left ear was normal, but the right ear contained fetid, thick pus proceeding from a chronic suppurative inflammation of the middle ear. On proper treatment



of the ear-trouble the abscesses ceased to recur, and three months later the patient stated that she still remained free from them.

The treatment showed that the exciting cause of the abscess had been the suppuration in the middle ear. The pus had flowed along the Eustachian tube back upon the pharynx, and had thus infected the tonsil.

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#### A FIBROMA OF THE NASAL SEPTUM.

This case is unique both in its histological characteristics and in its seat, and equally so in the operation found necessary for its removal.

At a late meeting of the Laryngological Society of London (*Journal of Laryngology, Rhinology, and Otology*, 1896, No. 2), MR. W. R. H. STEWART showed a large fibroma which had been removed from the nasal septum after a slightly modified Mansell-Mouillin operation upon the upper jaw of the left side, subsequent to a preliminary tracheotomy. This operation had been undertaken under the impression that the growth took its origin at the base of the skull, it having been found impossible to insinuate a wire between the tumor and the roof of the pharynx. After exposure, the tumor was pulled away with some difficulty, the posterior knob being firmly held by atmospheric pressure in a rounded hollow in the base of the skull. When fresh the growth measured  $4 \times 2\frac{1}{2} \times 1\frac{1}{8}$  inches, and was found to have grown by a very small pedicle from a ridge of a much-distorted septum. The pedicle contained a piece of bone.

The patient was a man over fifty years of age, and had had a blow upon his nose forty-four years before. Twenty-five years ago his nose began to get blocked, and the case gradually grew from bad to worse, until complete blockage of both sides was established. The nose was considerably bulged on the left side. Examination revealed a large tumor projecting slightly from the anterior nares and filling up the rhino-pharynx.

A section from the centre of the growth showed it to be composed of a very dense white fibrous tissue, arranged as lobes growing from a less dense central hilum, which contained spicules of bone near the pedicle.

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#### TUBERCULOUS INFILTRATION OF THE PHARYNX AND TONGUE.

At a meeting of the Laryngological Society of London (*Journal of Laryngology, Rhinology, and Otology*, No. 2, February, 1896) DR. CLIFFORD BEALE showed specimens from cases of long-standing tuberculosis of the lungs. Ulceration had only appeared a few weeks before death, and seemed clinically to be only superficial in character. Careful microscopic examination by Dr. Hugh Walsham, however, proved that the infiltration extended deeply into the muscular layers, both in the pharynx and in the tongue. There had been remarkable enlargement of the papillæ of the dorsum of the tongue, but without apparent connection with the tuberculous infiltration. In one case the tonsil was found to be free from tuberculous infiltration, although it had been so long bathed during life in tuberculous débris from the ulcer.

At the same meeting MR. DE SANTI showed pathological specimens of tuberculous ulceration of trachea, larynx, and pharynx from two patients.

CASE I.—Male, aged twenty-eight years, began to get ill in October, 1894.

Voice lost early in October, 1895, when laryngoscopic inspection showed well-marked tuberculosis of the larynx. In the beginning of November an ulcer the size of a sixpenny-piece was noted in the posterior wall of the pharynx. The patient died November 20th.

At the post-mortem well-marked extensive phthisis and empyema were found, and well-marked tuberculous ulcers of the trachea and larynx in addition to the tuberculous ulcer in the posterior wall of the pharynx.

CASE II.—A man suffering from phthisis was operated upon in October for tuberculous disease of the right metatarso-phalangeal joint. His disease rapidly increased. In the beginning of November miliary tubercles were found on the soft palate, fauces, and pharynx. After death the pharynx and fauces were found to be the seat of tuberculous infiltration and ulceration, and there was a small ulcer at the base of the left vocal band.

DR. DE HAVILLAND HALL stated that he had a similar case under his own care, and mentioned the rarity of having three cases of tubercular disease of the pharynx in one ward at the same time.

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#### TOPICAL TREATMENT OF LARYNGEAL TUBERCULOSIS.

DR. A. KUTTNER, in a paper read before the Hufeland Society (*Berl. klin. Woch.*, 1896, No. 3), discusses the subject in a very conservative manner. While acknowledging that superficial ulcerations sometimes cicatrize thoroughly, and occasionally a deep ulcer also, he recognizes that this result in serious cases is so infrequent as to be out of all consideration as an argument in discrediting topical chyrurgical measures. On the other hand, he says that considerable prolongation of life, and sometimes apparent, if not absolute, cure may be attained by such procedures.

One of the greatest difficulties to be encountered in tuberculosis of the larynx is the pain and difficulty in swallowing, which in some cases is so great as to disable the patient from taking nourishment or quenching thirst. In these cases, if diseased tissue can be removed in sufficient extent to enable the patient to resume his meals, a great deal of good results.

A few cases are mentioned from the doctor's own practice. One case of diffuse infiltration and ulceration was healed after splitting of the larynx and curettage, and has remained healed for four and a half years. Another case has remained healed for more than four years after a single curetting, following ineffectual treatment with lactic acid for months. A third patient in whom recurrence took place after curetting has remained cured for three years after use of the electric cautery. All these patients had been treated without effect with tuberculin under the typical reaction. Cases of similar character, but not so marked, are likewise mentioned.

The surgical processes discussed include incision, curettage, electro-cauterization, electrolysis, tracheotomy, laryngofissure, and resection of the larynx. In the presence of high fever, extensive implication of the lungs, and serious impairment of the patient's strength, none of these operations is justifiable, unless they happen to be indicated for the purpose of preventing immediate danger to life. Incision and curettage are indicated when there is a hopeful condition of the general system with rather circumscribed tuberculous disease in the larynx. Electric cautery is sometimes better even than curet-

tage. Larger tissues are better excised than burned away, but it has been found of great practical value to cauterize the field of operation and a little beyond it. The cicatrices thus secured by the burning are said to be firmer than those which follow incision. Tracheotomy is believed to be of service in procuring rest to the larynx from phonation and respiration, and saving it from the contact of secretions from the lungs and bronchi.

Laryngofissure is believed to be indicated in cases of extensive infiltration which are beyond the reach of instruments introduced by the natural passages. Everything that is diseased can be removed by direct access. Four cases are mentioned in which this practice was justifiable by the improvement which followed.

Extirpation of the larynx is not considered justifiable; either the cartilages are intact, in which case laryngofissure answers every purpose, or else they are already diseased, and then there is very little hope of recovery.

Dr. Kuttner recommends treatment of tuberculosis in institutions devoted to the purpose, to which patients should be sent in their earliest possible stages, and he expressed the hope that such establishments will soon be furnished with assistants more able to carry out the procedures which he has discussed, before the morbid process in the larynx has become extensive.

#### AN IMPROVED DEVICE FOR CORRECTING CERTAIN DEFORMITIES OF THE NOSE.

DR. F. E. HOPKINS describes and depicts (*New York Medical Journal*, June 8, 1895) a metallic bridge to correct a deformity of the nose whose supporting framework has been destroyed by accident or disease. It is made of platinum a fiftieth of an inch in thickness, and moulded to suit the individual. It has a pair of pointed arms to be set into openings drilled into the superior maxillary bone.

Dr. Hopkins states that by doing Rouge's operation ample room is secured to place the bridge properly, and that it is retained in position with surprisingly little irritation.

#### SUPPURATIVE DISEASE OF THE ACCESSORY SINUSES OF THE NOSE.

DR. J. H. BRYAN, of Washington, reported (*New York Medical Journal*, October 12, 1895) a number of cases at the last Congress of the American Laryngological Association. This paper is accompanied with an admirable series of illustrations to exhibit the anatomical relations of the sinuses, and the methods of obtaining access to them for diagnostic and operative purposes.

#### THE NECESSITY OF TRACHEOTOMY IN BILATERAL PARALYSIS OF THE CRICO-ARYTENOID MUSCLES (ABDUCTOR PARALYSIS).

A highly instructive case is reported by C. W. HARTWIG, M.D., of Baltimore (*Presbyterian Eye, Ear, and Throat Charity Hospital Reports*, 1896, No. 1).

The patient was a colored man, thirty-two years of age, with labored respiration and well-marked inspiratory stridor on exertion. Laryngoscopic inspection revealed absolute paralysis of the left vocal band in abduction, and



almost complete paralysis of the right hand. On inspiration the hands were brought in apposition, which completely closed the glottis, and on expiration they presented a vaulted appearance. Immediate tracheotomy was urged, but for some reason or other it was put off by the patient. On the fourth day of his admission into the hospital Dr. Hartwig was suddenly summoned by the nurse with the news that the man was dying, and the doctor found him throwing his arms in the air, gasping for breath, and unable to enunciate a syllable. Dr. Hartwig quickly secured a scalpel and a pair of scissors, and drawing the patient over the side of the bed plunged the knife into the trachea just below the isthmus, enlarged the incision with the scissors, then with his scissors and his finger separated the opening; turning the patient over on his side to prevent the blood, which had already become carbonized, from trickling down. Dr. Driver, who was assisting Dr. Hartwig, resorted to artificial respiration, after which the canula was inserted. The patient did well.

This case well illustrates the risk that is run when tracheotomy is delayed in cases of this kind. Such practice is reprehensible.

The compiler knows of cases in which the obstinacy of the attending physician has sacrificed lives which would have been saved had the consultant's advice been followed.

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## OBSTETRICS.

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### UNDER THE CHARGE OF

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### PARTIAL ABORTION: EXPULSION OF THE AMNIOTIC SAC ALONE.

In the *Edinburgh Medical Journal*, 1896, No. 488, HAULTAIN reports a case of abortion supposed to be at the period of three months. The sac expelled was the size of a large orange, distended by amniotic liquid, and composed of the amnion only. In addition to this, he has noticed two other examples of the expulsion of the amniotic sac unruptured and without the chorion. In one of them the amount of amniotic liquid was unusually great. He describes one of his cases in detail as follows: The patient was aged thirty-seven years, and pregnant for the third time. After a few hours of abdominal pain and slight hemorrhage, she expelled a cyst the size of a goose-egg. When her physician arrived he found that all clots had been removed, and that the cyst only remained. There was but little hemorrhage, the os uteri was but slightly dilated, and uterine contractions had ceased. The natural inference was that abortion had been complete. For two weeks the patient did well, there being, however, an excessive watery vaginal discharge. After

the third week the patient lost blood also. She grew progressively weak, and six weeks after the abortion Haultain saw her in consultation. The uterus was considerably enlarged, and the os uteri but little dilated. After using Hégár's dilators, it was found that the uterine cavity was lined with decidua. This was removed with difficulty, and with considerable hemorrhage. The patient went on to recovery. On examining the tissue removed it was found to be composed of chorionic membrane adherent to the decidua, and rich in villi.

It is supposed in these cases that the embryo has previously perished, which renders the attachment of its membranes to the uterus a feeble one. In some of these cases the embryo has been absorbed before the amniotic sac is expelled; in others it was found present.

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#### A CONSERVATIVE CÆSAREAN SECTION FOR ECLAMPSIA.

In the *Annali di Ostetricia e Ginecologia*, 1896, No. 1, DECIO reports the case of a patient, seven months pregnant, suddenly taken with eclampsia, whose health before marriage had been excellent. She had suffered, however, from a gradual diminution in the secretion of urine and from disturbance of vision. Upon the advent of symptoms of eclampsia, she was taken at once to the hospital, and an effort made to dilate the mouth of the womb with Hégár's dilators. The fetal heart-beat could be heard, and was 120 to the minute. The patient was given a purgative enema, and morphine injected hypodermatically. On the following day the secretion of urine had increased in amount, but was highly albuminous, while the pulse had risen to 124. Hoping that delivery could be effected by the natural passages, the vagina was tamponed and chloral was given by rectal injection. The patient's condition, however, grew worse. Dilatation of the uterus proceeded very slowly, although the patient was anesthetized by chloroform. When partial dilatation had been obtained an effort was made to perform version by Braxton-Hicks's method, with the hope of securing rapid delivery. This effort proving unsuccessful, the abdomen was opened and the fetus delivered by Cæsarean section. Hemorrhage was readily controlled by an elastic ligature, and the uterus sutured, the abdomen sponged dry, and the abdominal wound closed. A rubber drainage-tube was inserted in the cervical canal. The uterus was made to contract by ergotin given hypodermatically, and the rubber tube was forced out of the uterus. The fetus was dead, and showed signs of beginning maceration. The mother's urine was at first 55 per cent. albumin. Her condition, however, steadily improved, and she ultimately made a good recovery.

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#### THE ADVANTAGES OF SYMPHYSIOTOMY.

In the *Annales de Gynécologie*, 1896, vol. xlv., QUEIREL writes enthusiastically of the advantages of symphysiotomy. He describes the case of a primipara, aged forty-two years, who suffered from lingering labor, during which the physician in attendance made fruitless attempts to deliver with forceps. The patient had a contracted pelvis, which was not at first discovered. Queirel, when called in consultation, was obliged to deliver by

embryotomy, which was not difficult. The patient had become so exhausted that she died of shock a few hours afterward.

He also reports the case of a primipara with contracted pelvis in whom dilatation was slow, the bag of waters having ruptured prematurely. Dilatation was completed by Champétier's bag, but the head failing to descend, symphysiotomy was performed. A living child was born, mother and child making a good recovery.

He also describes the case of a patient upon whom fruitless efforts had been made to deliver with forceps, and who was admitted to the hospital with a ruptured uterus. He calls attention to the unnecessary loss of life for mother and child in cases in which symphysiotomy, performed under modern surgical precautions, would have saved both lives.

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#### THE EFFECT OF SYMPHYSIOTOMY IN PERMANENTLY ENLARGING THE PELVIS.

In the *Centralblatt für Gynäkologie*, 1896, No. 4, Woyer describes the case of a patient who had lost one child by forceps-delivery, and had borne another spontaneously. In her third pregnancy she entered Schauta's clinic in Vienna, where it was found that she had a contracted pelvis of the flat rhachitic type. Under strong pains the head engaged with the occiput directed behind. It failed to descend, and a contraction-ring gradually formed. An effort was made to deliver with forceps, which proved unsuccessful, and symphysiotomy was performed. The symphysis was brought together with silver wire, mother and child making a good recovery. This patient subsequently became again pregnant, and entered the clinic for confinement. It was found that the rhachitic type of pelvis, as shown by the previous measurements, had been replaced by a normal pelvis. Birth proceeded spontaneously without difficulty. During labor, the finger was placed against the symphysis and the pelvimeter applied between the crests of the ilia. By neither could any stretching of the pelvis be discerned. The child was born living, and mother and child made a good recovery.

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#### PREGNANCY AND LABOR IN CASES IN WHICH SUSPENSION OF THE UTERUS HAD BEEN PREVIOUSLY PERFORMED.

One of the most interesting and important contributions to this subject is the paper by STRASSMANN (*Archiv für Gynäkologie*, 1896, Band 1., Heft 3). He writes from the Polyclinic of the Charité in Berlin. Three methods of suspending the uterus by operative procedure are recognized: one in which the uterus is suspended by shortening the round ligaments, a second by joining the uterus to the anterior wall of the abdomen, and the third by uniting the womb to the bladder, or to the anterior wall of the vagina. So far as the results of pregnancy go, in cases operated upon by these different methods, shortening the round ligaments would seem to give the best results, with the least interference with the natural mobility of the uterus during pregnancy and labor. The number of abortions occurring in these patients is also very small, and no case is found upon record in which at labor serious complication have arisen. Pregnancy seems to occur as frequently as is normal after this operation.



Of the various methods of suspending the uterus to the anterior wall of the abdomen, that of Czerny and Leopold seems best, because by this method the stitches are removed and the uterus is left more mobile than in cases in which the sutures are retained. Pregnancy frequently occurs after this operation, and the number of abortions is not noticeably great.

In reviewing cases in which difficulty has occurred at labor after suspension of the uterus Strassmann calls attention to Goubaroff's case, in which a living child was delivered by Cæsarean section, efforts at external version having failed and it being impossible to dilate the mouth of the uterus. It was feared to make pronounced efforts at version because the posterior wall of the uterus was very greatly dilated and threatened rupture. Strassmann reports the case of a multipara, aged thirty-six years, whose uterus had been suspended to the abdominal wound with catgut sutures in an abdominal section by which an ovarian cyst upon one side had been removed. When labor came on the tissues at the site of the original scar were very much drawn in, while the descent of the child seemed hindered by the lack of mobility in the uterus. Not much difficulty was experienced in extracting a living child with forceps. Free hemorrhage occurred after the delivery of the child, which was only checked by carrying the uterus strongly downward into the brim of the pelvis, and by placing a compress above the uterus with an abdominal binder. It was observed in this case that the adhesion between the uterus and the abdominal wall stretched readily, and that the fundus and posterior wall of the uterus were also adherent. It was observed that adhesions between serous surfaces permitted the greatest elasticity during labor, and gave the best results in delivery.

When, however, the uterus is attached to the wall of the vagina, the adhesion is by connective tissue, and a firm and unelastic scar develops. Unless the posterior wall of the uterus distends greatly during pregnancy, abortion is inevitable. Dührssen finds that in cases becoming pregnant after this operation 25 per cent. aborted. Of patients treated for retrodisplacements with pessaries, but  $16\frac{6}{10}$  per cent. aborted, while of patients treated by fixation of the uterus to the vagina  $27\frac{2}{10}$  per cent. aborted. If retroversion of the uterus be compared with other diseases of the uterus, it is found that retroversion offers the least obstacle to conception. It is possible for the uterus to become separated from the vagina during pregnancy. If it does not, the uterus must become greatly distended in its posterior wall.

Strassmann describes two cases of labor in patients in whom the uterus had been attached to the anterior wall of the vagina. In the first case the cord prolapsed, the mouth of the womb was drawn upward and backward, while the anterior wall of the vagina was forced downward and very greatly distended. In this sac lay the right shoulder and arm. A difficult version made possible the delivery of the child, followed by severe hemorrhage. In this case, as retraction of the uterus did not take place, it was necessary to carry it down into the pelvis, and to retain it there by a pad and bandage. The patient made a good recovery.

The second case reported is that of a patient from whose uterus a small fibroid had been removed, and the womb attached to the anterior wall of the vagina. At labor it was found that it was very difficult to empty the bladder the mouth of the womb was drawn very strongly upward and backward, the

child being in shoulder presentation. Although dilatation was advanced by elastic dilators, it was impossible to make version because of the danger of rupturing the uterus. An eclamptic attack supervened, and tetanus of the uterus gradually developed. The anterior vaginal wall formed a sac or pocket, and the posterior wall and posterior portion of the lower uterine segment were greatly distended. Under anæsthesia it was found impossible to perform version or craniotomy. Abdominal section was accordingly done, the uterus amputated, and the stump fastened to the abdominal wound. The patient died of shock. On post-mortem examination a laceration of the vagina was found between the anterior lip of the uterus and the point of fixation of the fundus. Some hemorrhage had occurred from the region of the right broad ligament into the abdominal cavity.

In view of the complications arising at labor Strassmann would limit suspension of the uterus to Alexander's operation, or to ventro-suspension by bringing together serous surfaces and removing the stitches. In view of the fact that many cases can be cured by pessaries and other methods of treatment, he would avoid, if possible, suspension of the uterus in women who are likely to bear children.

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#### THE COURSE OF PREGNANCY AND LABOR IN CASES IN WHICH THE UTERUS HAS BEEN FIXED TO THE VAGINA.

Among the many recent contributions to the literature of this subject is that of WERTHEIN (*Centralblatt für Gynäkologie*, 1896, No. 2). He found that out of thirty-seven cases of vaginal fixation of the uterus three had subsequently become pregnant. One of these terminated in abortion at four months, another in normal labor after a normal pregnancy. The third patient was one in whom the tissue between the bladder and the uterus had been opened, and the uterus had been directly united with the vagina. Before the pregnancy the fixation of the uterus was a remarkably firm one. As pregnancy progressed the vagina was drawn up with the growing uterus, forming a diamond-shaped area, accompanied by the gradual ascent of the vaginal portion of the cervix. Fearing complicated labor, the patient was instructed to enter the clinic upon the onset of labor. Upon examination, the foetus was found in transverse position, the head upon the right, the foetal heart-sounds near the umbilicus. The anterior wall of the vagina was drawn up behind the symphysis so that the scar could scarcely be felt. The cervix was so high that it was necessary to introduce the entire hand to reach it. The anterior lip of the cervix was thickened, the posterior lip very much thinned. But little of the uterus remained within the pelvis. The round ligaments on both sides could plainly be felt converging toward the middle line at the region of the umbilicus. The patient was a multipara, and had strong labor-pains, in spite of which the birth did not advance. The cervix dilated very slowly, the anterior wall of the uterus being drawn down above the symphysis. It was necessary to hasten labor on account of the great distention of the posterior wall of the uterus, which threatened rupture. Under deep anæsthesia combined version was performed and a foot drawn down. Three hours afterward a living child was delivered. Immediately after labor the uterus was examined by the hand; the thinning of the posterior wall of

the womb was very remarkable, and the vagina seemed to pass into the uterus without appreciable distinction. The patient made an uninterrupted recovery. On examination afterward the attachment of the uterus to the anterior vaginal wall was found in no way weakened.

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#### FERRIPYRIN, A NEW HÆMOSTATIC FOR OBSTETRIC USE.

SCHAEFFER (*Centralblatt für Gynäkologie*, 1896, No. 2) draws attention to the following advantages which he claims for this substance in obstetric practice. Where escharotic effect is not desired, a 16 to 18 per cent. watery solution of ferripyrin may be used to advantage to check hemorrhage. In vaginal douches this substance is also very useful, and in solutions of 1 to 1½ per cent., by irrigation or with tampons, it tends to lessen pain. In powder it may be applied to cancer to lessen hemorrhage and allay pain, with great success. It may be used for this purpose upon gauze. In cases of hæmatinuria it is equally valuable. It may also be given by the mouth for hemorrhagic conditions in adults, and in children, with excellent results.

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### GYNECOLOGY.

UNDER THE CHARGE OF

HENRY C. COE, M.D., M.R.C.S.,  
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#### SYMPATHETIC GANGLION IN THE OVARY.

ELIZABETH WINTERHALTER (*Archiv für Gynäkologie*, Band li., Heft 1), as the result of a careful study of the ultimate terminations of nerve-fibres in the ovary, concludes that the ovarian vessels are surrounded by nerve-plexuses, and that a ganglion is situated within the zona vasculosa, which contains cells similar to those of the sympathetic ganglia. Processes from this ganglion anastomose with the perivascular plexuses.

Exner's researches seem to show that ganglion-cells receive and store up impulses transmitted to them, to discharge these again as soon as the stimulus has reached a certain height. A ganglionic system may be interposed between sensory and motor terminal fibres, as in that between the follicular layer and medullary vessels of the ovary. This would appear to throw some light upon the causal relation between the ripening of a follicle and ovulation and menstruation.

Pflüger inferred that the growth of the former caused a constantly increasing irritation of the nerves of the ovary, which at its height gave rise to a centripetal impulse, inducing in its turn arterial congestion of the pelvic organs. According to the present theory, it is not necessary to suppose that the spinal centre is affected, the ovarian ganglion being the immediate reflex centre in which are accumulated impulses due to the pressure of the ripening ovisac. These which culminate and are discharged along motor fibres to the



perivascular plexuses of the ovary and then to the similar plexuses of the entire genital tract are reinforced, possibly, by a further reflex action on the part of Frankenhäuser's cervical ganglion. Hence a periodical increase in the amount of blood supplied to the uterus, with the resulting phenomena of menstruation.

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#### FIBRO-SARCOMA OF THE OVARY.

KRUKENBERG (*Archiv für Gynäkologie*, Band 1., Heft 2) reports five cases of solid tumor of the ovary, which presented histologically a mixed structure, partly fibro- and myxo-sarcoma and partly scirrhus carcinoma. These neoplasms, he states, are always bilateral, occur in young as well as in old subjects, and grow slowly, ascites being usually present. The entire ovary is affected, but maintains its usual form even when much enlarged, although the surface becomes more or less nodular. On section they show a firm, homogeneous structure with myxomatous softening in the interior; cysts may result either from the latter cause or from the dilatation of follicles. Histologically they present more or less marked hyperplasia of the ovarian connective tissue, and may be characterized as fibro-sarcomata, rich in cell-elements, and with a tendency to mucoid degeneration, hence the appropriateness of the term *fibro-sarcoma ovarii muco-cellulare carcinomatodes*, the latter being added in view of the fact that they develop metastases of the epithelial variety, and are quite malignant. Although these growths may remain stationary for a long period, they have a marked tendency to become disseminated through the lymphatics, first within those of the ovary itself, then in the vessels of the tube and corresponding broad ligament, and often in distant parts of the body.

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#### INVERSION OF THE NON-PUERPERAL UTERUS.

HOLLÄNDER (*Deutsche med. Wochenschrift*, 1896, No. 10) reports the case of a patient, aged forty years, who was brought to the hospital in collapse, with profuse hemorrhage, which had begun suddenly a short time before, simultaneously with the sudden appearance of a mass at the introitus. On examination the uterus was found to be completely inverted, a small fibroid being attached near the fundus. The tumor was enucleated, but it was impossible to reduce the uterus after efforts had been continued for a month, and finally the organ was removed *per vaginam*, the patient making a good recovery.

The writer cites the case as a strong argument against the theory of inversion supported by Schauta, that it is due to relaxation of the uterine muscle rather than to active contractions. In this instance the muscle was quite normal; there was no prolapsus or increased abdominal pressure, the accident being preceded by painful contractions similar to those of labor, which were entirely out of proportion to the size of the tumor which the uterus was attempting to expel. The neoplasm being situated centrally, with a broad base, it was inferred that contraction took place most forcibly at the fundus and pressed it straight downward through the os internum until inversion took place. Under these circumstances operative interference would seem to be at once indicated in contrast with cases in which inversion is due to relaxation of the uterus.

## EXTIRPATION OF CARCINOMA OF THE VAGINA.

FRIEDL (*Wiener klin. Wochenschrift*, 1896, No. 3) states that primary cancer of the vagina is not so rare as is supposed, upward of 130 cases having been recorded. The circumscribed, papillary variety offers the best prospects for operative interference, and is situated most frequently on the posterior wall.

Olshausen recommended attacking the growth through the perineal incision.

Dührssen adopts the same method, extending the cut from the vagina to the tuber ischii through the levator, and also making a parasacral incision, removing healthy tissue at a considerable distance from the growth. The writer reports two cases in which Forggler combined these methods with good results.

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## INFLUENCE OF FIBRO-MYOMATA ON THEIR ENVIRONMENT.

FABRICIUS (abstract of monograph in *St. Petersburger med. Wochenschrift*, 1895, No. 36) discusses at length the various complications due to the presence of uterine fibro-myomata, especially the circulatory disturbances, hemorrhoids, thrombosis, and embolism of the vessels of the lower extremities. Pressure on the bladder and ureters and secondary hydronephrosis may occur. With rapidly growing tumors brain-atrophy and fatty degeneration of the heart are not uncommon. In forty-two specimens of tubes removed with fibroid uteri the former were diseased in all but sixteen cases, simple salpingitis, with thickening of the muscular tissue, being most common.

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## PATHOLOGY AND BACTERIOLOGY.

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UNDER THE CHARGE OF

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## THE IDENTIFICATION OF THE TYPHOID BACILLUS.

The many difficulties attending the separation of the typhoid bacillus from other closely allied species are familiar to everyone who has undertaken its detection in feces in cases of suspected typhoid fever, or who has attempted to cultivate it from infected water-supplies, milk, etc. In the examinations of feces it is the rapidly growing colon-bacillus which is the chief disturbing influence; in water and in the soil there are a number of forms as yet only imperfectly studied which present many of the same characters as the typhoid bacillus and are difficult of distinction from it.

Meeting with this difficulty in connection with the study of several bacteria separated from various sources (earth, water, feces, etc.), LOESENER has made a most painstaking study of the literature with a view to determine the distinctive features of the typhoid bacillus (*Arbeiten aus dem Kaiserlichen*

*Gesundheitsamte*, xi., 207. Cf. *Fortschritte der Medicin*, 1896, xiv., No. 4, 150). His conclusions sum up the results of 689 separate articles in so far as they bear upon the cultural characteristics of the germ.

Ten characters are given as at present distinctive of the typhoid bacillus:

1. The appearance of the superficial colonies in gelatin plates.
2. The very active motility.
3. The large number of flagella originating from all parts of the bacilli.
4. Decoloration by Gram's method.
5. Growth in media containing grape-, milk-, and cane-sugar without gas-formation.
6. Growth in milk without causing its coagulation.
7. Growth in proteid-containing media without generation of indol.
8. Production of acid when grown in whey, but not in excess of 3 per cent., as tested by one-tenth normal soda-solution.
9. The growth on potato. This should be identical with that of a known culture of the typhoid bacillus planted simultaneously in parallel streak upon the same potato.
10. The failure to grow in Maassen's normal solution with glycerin.<sup>1</sup>

In the identification of the typhoid bacillus no one of these characters is alone sufficient; when all are present the evidence of the presence of that germ may be said to be very strong. Nevertheless, in his investigation, Loesener felt some doubt as to the identity of bacilli obtained from five different sources, all of which possessed all the characters above enumerated, since only two of them, upon being subjected to Pfeiffer's serum-test, corresponded in that also to the typhoid bacillus.

Loesener's conclusion is, then, that as yet we have no positive means of identification of the typhoid bacillus in cultures. His article is followed by a very extensive bibliography.

The Pfeiffer serum-test above referred to deserves brief mention, because if further confirmed it will afford a valuable ultimate test in doubtful cases, though it can hardly have a very wide usefulness, as it presupposes that the investigator has ready at hand blood-serum of an animal made immune to the toxin of the typhoid bacillus. As yet only a preliminary communication of this test has been published (*Deutsche medicinische Wochenschrift*, 1894, No. 48, 898), though it is referred to by a number of writers in such a way as to make it appear that it has already had quite an extensive use.

According to Pfeiffer, the poison of the typhoid bacillus is intimately connected with the bodies of the bacteria, and, though very unstable, remains potent after they have been killed by the vapor of chloroform or by heating for an hour at 59° C. The fatal dose of this toxin is from 3 to 4 milligrammes for every 100 grammes weight of animal. But by the use of smaller doses he was able to induce immunity, and in the blood of such immune animals antitoxins were discovered having decided bactericidal properties as regards the typhoid bacillus, but devoid of any such action upon the colon-bacillus and other allied forms. These antitoxins are also found in the blood of convalescents from typhoid fever.

The test, then, proposed by Pfeiffer is the inoculation of animals susceptible

<sup>1</sup> A proteid-free solution of malic acid, asparagin and basic sulphates, phosphates, chlorides, and carbonates.



to the toxin of the typhoid bacillus with a mixture of the suspected culture and the serum of an immune animal. If it be the typhoid bacillus, it will have been made innocuous by the antitoxins of the serum, and no pathogenic effect will result; but if it be any other species, the inoculation will be followed by the result characteristic of that species, as if the serum had not been used. In inoculated mixtures of the typhoid bacilli and the antitoxins the bacilli are said to disintegrate rapidly and disappear.

In view of the complexity of this subject and the uncertainty of all the tests of the identity of the typhoid bacillus which had been proposed, ELSNER undertook an extended experimental investigation of the growth of the bacillus on a very large number of culture-media of different sorts, introducing into their composition all manner of chemicals, animal and vegetable extracts, etc., in the hope of discovering some medium which would afford a differential test (*Zeitschrift für Hygiene u. Infektionskrankheiten*, 1895, xxi, 25). His work was most exhaustive and painstaking, and as its result he offers a new culture-medium upon which the typhoid and colon-bacillus grow readily, but which appears to support the growth of very few, if any, other forms which are met with in feces and in water.

The medium in question is Holz's<sup>1</sup> acid potato-gelatin containing 1 per cent of potassium iodide.

With this medium Elsner has examined sewage, water, feces, soil, etc., from many different sources with which the typhoid bacilli were mixed artificially, in order to determine whether by its use the bacilli could be detected in such menstrua, and with the most gratifying results. It was possible to detect the typhoid bacillus in water in which it was 8000 million times diluted. In feces the colon-bacillus alone grew as a contamination, but its colonies were very readily distinguishable from those of the typhoid bacillus. Thus in twenty-four hours the colonies of the *bacillus coli communis* were well developed and of characteristic appearance, while those of the typhoid bacillus were still invisible to the naked eye, appearing only as minute spots under the microscope. At the expiration of the second day the typhoid colonies were evident as a second crop of characteristic appearance. They are described as small and shining, resembling minute droplets of water, and are finely granular. The colonies of the colon-bacillus are large, coarsely granular, and have a brownish color.

With the assistance of Kolle thirty different cultures of the typhoid and colon-bacilli obtained by this method from various sources were subjected to Pfeiffer's serum-test, and in all cases the differentiation obtained by the new culture-medium was confirmed.

Of seventeen cases of typhoid fever investigated the specific bacilli were cultivated from the feces in fifteen, representing all stages of the disease from the seventh day to the sixth week.

<sup>1</sup> Holz's acid potato-gelatin is made as follows: 500 grammes of cleaned, peeled potatoes are ground into fine pulp on an ordinary grater, are covered with a litre of water and allowed to stand in a cool place for twenty-four hours. The extract is then strained off, 100 grammes of gelatin are added and the whole is boiled and filtered. The resultant medium has a brownish color and should be perfectly clear. Its acidity is usually such as to require from 2.5 to 3 c. c. of one-tenth normal soda-solution for the neutralization of 10 c. c. of the medium. If greater, it should be brought within these limits by the addition of an alkali. Cf. F. Holz: *Zeitschrift f. Hygiene*, viii. 143.

These results of Elsner, though published so recently as December of last year, have already received confirmation from two sources.

At the suggestion of Professor Renoers, LAZARUS undertook the examination of the stools of the typhoid fever patients in the Moabit Hospital in Berlin (*Berliner klinische Wochenschrift*, 1895, No. 49, 1068).

Twenty-one patients were thus examined. Of these five were well-marked cases in the first to the third week of the disease; the remaining sixteen were convalescents who had been without fever for some time. In all five of the active cases the typhoid bacilli were repeatedly separated from the stools in cultures by Elsner's method after forty-eight hours' growth (in one case after three days), and were readily obtained in pure culture from the first plates. One case was of unusual interest, in that on the occurrence of a relapse in the eighth week of the disease the bacilli reappeared in the stools after having been absent for some time.

Of the sixteen convalescents, in whom defervescence had occurred from three days to six weeks before the examination, in three only were typhoid bacilli detected, but in these repeatedly, though there appeared to be no disturbance of the alimentary tract, the stools being of normal consistence.

Lazarus adds nothing to the description of the method as given by Elsner, but he lays much stress on the importance of having the plates thinly sown, as otherwise the growth of the colon-bacillus may be inhibited and the differences between its colonies and those of the typhoid bacillus less marked in consequence.

In all of Lazarus's positive cases the identity of the typhoid bacillus was substantiated by comparative cultures with undoubted typhoid bacilli, and in one case the cultures were also subjected to Pfeiffer's test.

Similar success has attended examinations made by Brieger (*Deutsche medizinische Wochenschrift*, 1895, No. 50, 835) at the Institut für Infektionskrankheiten. Eleven cases only were examined, but in all the typhoid bacillus was detected without difficulty.

Case VII. is of particular interest, since, with the exception of slight fever and malaise, none of the usual symptoms of typhoid fever was present. The patient presented himself at the hospital, complaining of having felt miserable for the preceding two weeks. His mind was clear; there was neither roseola nor enlargement of the spleen, and Ehrlich's diazo-reaction was not given by the urine. From the beginning the bowels were obstinately constipated. Examination of the stools on two occasions, at an interval of five days, gave typical cultures of the typhoid bacillus, and the diagnosis was later confirmed by the fact that the patient's blood showed distinct immunizing power when tested with cultures of the typhoid bacillus.

Brieger very properly emphasizes this case as illustrative of the value of Elsner's test in fixing the diagnosis in ambulatory cases of the disease, in which neglect of proper precautions may lead to most unfortunate results both to the patient and, by increasing the liability of infection, to others.

The remaining ten cases presented well-marked symptoms of typhoid fever, and, so long as the fever persisted, the bacilli were abundant in the stools. The rapidity of their disappearance after cessation of the fever would appear to vary greatly, and Brieger draws attention to the necessity of great care to avoid a relapse in cases in which they persist in large numbers for any con-

siderable time after defervescence. He also suggests examination of the stools of attendants upon typhoid-fever patients and of others who have been exposed to infection, in the belief that if detected early the disease might often be aborted by free purgation with calomel.

Brieger further believes that Elsner's method has opened the way for a much better understanding of the habitat and mode of dissemination of the typhoid bacillus outside the body. An investigation of this subject by Elsner is already in progress.

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#### THE ETIOLOGY OF PNEUMOTHORAX WITHOUT PERFORATION OF THE LUNG.

The possibility of the occurrence of pneumothorax without perforation of the lung, as the result of putrefaction of a pleuritic exudate with gas-formation, was suggested by Laennec, but has always been regarded with suspicion.

The recent bacterial examination of the exudate from a case of pneumothorax, in which neither perforation of the lung nor any cicatrix of the pleura could be discovered, has demonstrated the truth of Laennec's contention, and shows how important careful examination of the pleural contents may be in such cases in determining the diagnosis.

The case is reported by LEVY (*Archiv f. exper. Pathologie und Pharmakologie*, 1895, xxxv. p. 335). As far as physical signs went the case was an ordinary one of hydro-pneumothorax, later developing into empyema, and leading to the patient's death in spite of operative evacuation of the pus. Fortunately anaërobic plates were made and led to the discovery of a thick, short bacillus, with rounded ends, growing best in 2 per cent. sugar-agar at the body-temperature, and its growth giving rise to abundant gas-formation. Animal inoculations demonstrated its pathogenic quality and the association of gas-production with its growth in the tissues.

As this germ was separated in pure culture, Levy has no hesitation in ascribing to it the gas formed in the pleural cavity of his patient, and he in addition emphasizes the importance of making routine examinations for anaërobic bacteria in all cases in which a thorough bacterial examination is desired.

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#### CLOSURE OF THE CORONARY ARTERIES.

The frequent association of coronary disease with sudden stoppage of the heart's action has long been recognized, but much doubt has existed as to the precise reason for this result and as to the relative importance in its production of the different branches of the coronary arteries. In the hope of answering these and other questions of less pathological moment, PORTER (*Journal of Experimental Medicine*, 1896, i., No. 1, 46) has carried out an exhaustive experimental investigation of the effect of mechanical closure of the coronary arteries of dogs. The details of his experiments are too numerous for reproduction here, but his conclusions may be briefly summarized.

Complete closure of all the coronary arteries was in every case speedily followed by complete arrest of the heart-beat. This result was less constant when only one of the branches was occluded, the frequency of arrest being directly proportional to the size of the vessel occluded. Thus, of sixty-seven



experiments upon this point, arrest followed ligation of the ramus circumplexus in 64 per cent. of the cases, of the ramus descendens in 28 per cent., of the coronaria dextra in 14 per cent., and was not observed at all after closure of the branch to the septum.

That the stoppage of the heart is not the result of mechanical violence incidental to the ligation was shown in a number of ways, notably by the fact that it occurred as frequently when no injury was inflicted, closure of the vessels being obtained by the introduction of a glass rod into the coronary artery through the innominate artery and the sinus of Valsalva. And it was also noticeable that the frequency of arrest after ligation was *inversely* proportional to the amount of destruction of the heart-muscle, the circumplex branch being that most readily ligated.

In all cases in which arrest finally occurred there was distinct diminution in the blood-pressure, almost immediately following the operation, the heart quickly became engorged with blood, and within a very short time fibrillary contractions of the heart-muscle were observed, which persisted often for some time after complete cessation of any co-ordinate beat. These are believed by Porter to depend upon the persistence of a certain degree of contractility in the muscle-fibres after loss of the power of co-ordination by the more highly organized nervous mechanism.

The whole effect of closure of the coronary arteries is attributed to anæmia, the various branches of the coronary arteries being physiologically, if not anatomically, terminal arteries. It is an interesting fact that in several of the experiments removal of the obstruction to the coronary circulation and emptying of the engorged heart by rhythmical massage were quickly followed by return of the normal heart-action.

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By J. M. DA COSTA, M.D., LL.D.,  
OF PHILADELPHIA.

I PROPOSE in this paper to examine into the history and clinical features of fevers of long duration that are not typhoid fever, and to ascertain in how far these continued fevers form a type of their own. Let me first describe, by way of introduction to the subject, a couple of cases of most unusual length: one, seen some years ago from the beginning to the end of the disease, and often since; the other, a more recent one, investigated repeatedly during its course:

CASE I.—A number of years ago a young girl was brought to me with very poor digestion and great irritability of the stomach. By strict diet, the use of effervescing mixtures and laxatives, the disorder yielded in ten days, and free bilious discharges, for the most part dark-colored, took place at its end. Shortly afterward an inexplicable fever arose that lasted for three months. The fever was never very high; it did not, I think, ever exceed 103° F.; it was not ushered in by a chill, nor did chills happen during its continuance. There were, as in any fever, a morning remission and an evening exacerbation, but never to a marked degree; the fever was for weeks remarkably regular, only at times, and at no stated periods, showing irregularities in its course, and its subsidence and disappearance were as gradual and unmarked by violent changes as its onset. Late in the disease some sweating happened. Beyond the extraordinary fever there was nothing to note; there was no cerebral symptom, save occasional headache; neither nausea nor vomiting; no epistaxis; no diarrhœa, the bowels, indeed, were rather sluggish; no abnormal lung or heart condition; no albumin in the high-colored fever-urine; no eruption of any kind, not a single, even doubtful, rose-spot. A slight enlargement of the spleen was made out, but it was not decided. Indeed, there was nothing whatever amiss except

<sup>1</sup> Read by title at the meeting of the Association of American Physicians, April 30, 1896.  
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the apparently interminable fever. The convalescence did not prove a protracted one; emaciation was obvious, yet, considering the length of the fever, not extreme; there was no falling out of the hair. I regret that I have no record of the state of the nails, and am not certain whether the ridges which Longstreth and I have so constantly found after typhoid fever, were present. Neither before, at the time, nor since, has there been the least evidence of hysteria. Indeed, the girl of eleven years is now a young lady in the twenties, of unusual composure and vigor, though showing symptoms of gout, which she has inherited from her father. There was some talk of her having had malaria before the fever outbreak, but this was mere surmise, and the long fever was totally uninfluenced by quinine, as, in truth, it was by any other remedy. It seemed to leave when it had determined to leave.

CASE II.—A girl, fourteen years of age, was seen by me with Dr. Spivak in January, 1894, when she had been in bed with fever for over a month. When she came under his care she had been ill for two weeks, without abdominal symptoms, except a slight gastric disorder at the onset, but with decided fever; indeed, the temperature was  $105^{\circ}$  F., at or near which it stayed for three weeks longer. It then gradually declined, reaching  $101^{\circ}$  in the eleventh week, the fever not ceasing until at the end of the twelfth week, and disappearing gradually. At no time, save for a few days, was there more than one degree difference between the morning and evening temperatures. In these few days the temperature several times fell to  $99^{\circ}$ . Sometimes the fever was higher in the morning than in the evening. There were no catarrhal symptoms or bone-pains; dryness in the throat was complained of, but nothing but injection was to be seen; the tongue was dry. Neither meteorism, nor diarrhœa, nor abdominal rose-spots, nor any other kind of eruption existed. The urine was simply a fever-urine. The patient took food well, and even enjoyed it. The spleen did not extend beyond the border of the ribs. There was restlessness, but no headache. The pulse was rapid, always compressible; there was no cardiac disorder. In the eighth week some bronchial symptoms were found, and at the middle of the right lung anteriorly a spot was detected over which the percussion-resonance was impaired, and the breathing, which had been about twenty, became more hurried, but all this passed away in two weeks, leaving still the steady continued fever.

Quinine in small doses, quinine in large doses, produced no effect, although much buzzing in the ears was complained of. Salol, as well as the ordinary coal-tar antipyretics, had but a temporary influence on the fever, as did cold sponging, and getting the patient out of bed. There appeared to be more effect from salol than from anything, except it was from the iodide of potassium. After a few days of this treatment the fever stopped. But it is a question whether it had not worn itself out. The convalescence was not protracted.

I saw the girl about three months after her recovery. She was in excellent health, with ruddy cheeks. All traces of the emaciation, which had never been very great, had gone, and she had not lost her hair.

When we take these two cases together we find an apparently causeless fever of extraordinary duration, and presenting, like idiopathic fevers, no definite lesions. The cases are alike in the continuance of



the fever, in the very gradual yielding, in the absence of marked remissions or of relapses; they are alike in some gastric symptoms which happened in the early part of the case, and then subsided, while the fever went on unchecked; they are alike, too, in the absence of any cerebral symptoms, except it be restlessness and occasional headache, and in the very slight, indeed doubtful, enlargement of the spleen.

I record these two cases as examples of the most protracted ones of simple continued fever I have encountered, but there are cases, much more numerous, in which the disease lasts from two to three weeks, with exactly the symptoms described, and, though much shorter than these long-drawn-out instances, considerably longer than the simple continued fever ordinarily met with of about a week's duration. I have seen instances of this which it would be tedious to describe in detail, but I may mention that among the more pronounced were some among brokers and speculators in times of commercial panic, and that delirium in them was not an unusual symptom.

Let us contrast this fever-type, especially the instances of extraordinary length, with other fevers of protracted duration. To take, first, typhoid fever. Every instance of long-continued idiopathic fever is presumably typhoid fever. Yet typhoid fever does not last three months, unless kept up by complications, or unless repeated relapses happen. I have known a case prolonged for three months, in which temperatures of 105° F. repeatedly existed; but the enteric symptoms were throughout marked, and at the autopsy, besides the characteristic lesions in the ileum, an extensive colitis was found with thickening, and, here and there, sloughing of the mucous membrane of the large intestine, fully explaining the long fever and the frequent intestinal discharges. I have met with another instance of long-lasting typhoid fever with persistent high temperature, and similar intestinal affection, though in this case recovery took place. In both these cases there was no evidence of relapse, and the enteric signs were pronounced, making them totally unlike the ones we have here detailed, and the eruption was very marked. This, in a very long case of typhoid fever, Murchison found to appear almost daily up to the sixtieth day.

Taking ordinary cases, the characteristic temperature-tracing, the crops of eruption, the nervous symptoms, the intestinal features, are wholly unlike what we are here examining, and the definite cessation of the fever in the fourth week is one of the most certain phenomena. Nor is it necessary to do more than mention how great the dissimilarity to remittent fever, even if of more than average length, and to relapsing fever. Should a doubtful instance of the kind arise, the microscopical examination of the blood for the characteristic micro-organisms would speedily clear up the doubt. With reference to so-called typho-malarial fever, the history of the case and the enteric symptoms and enteric lesions are

of great significance. More difficult may it be to distinguish the continued fever that may follow a remittent fever. But the different onset of the malady, the chills or chilly sensations at the beginning, the disturbance of the digestive organs, the irregularity of the temperature, a sign to which Gervais Robinson<sup>1</sup> has particularly called attention, are specially significant. Then, too, the malarial organisms are of the greatest aid. Councilman<sup>2</sup> found them in the blood in many examinations he made of this continued malarial fever. The organisms were rather large crescentic forms, free in the blood and not in the corpuscles.

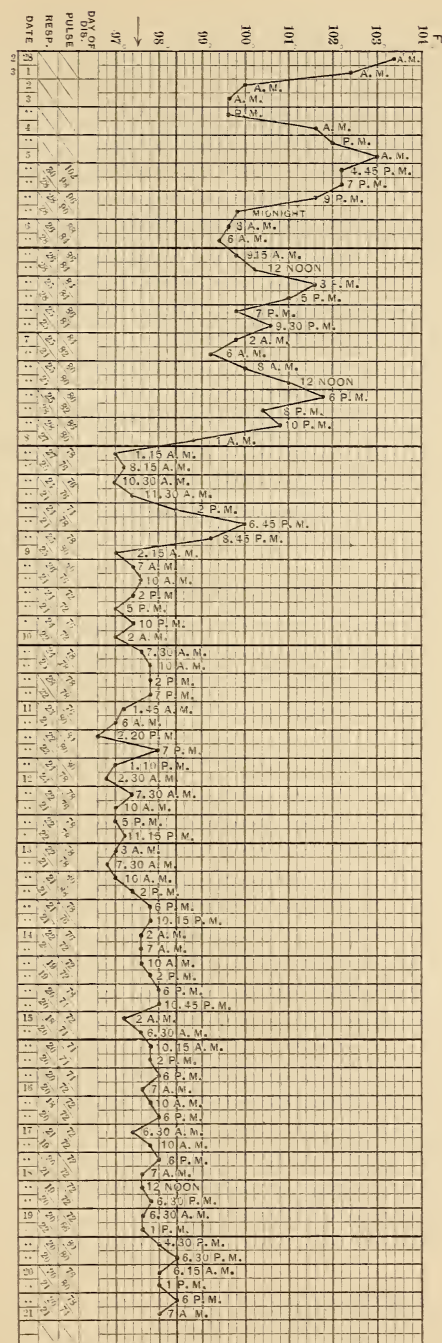
I think the greatest resemblance to very long idiopathic simple continued fevers is furnished by the protracted fever we sometimes meet with during epidemics of influenza. Here the catarrhal symptoms may long have passed away, though the fever strangely persists for weeks, a coated tongue, anorexia, slight irritation in the lungs, a few scattered râles, and a point of less perfect expansion being, perhaps, all that is found. I saw, among many others, during the epidemic of influenza a few years since, a case of this kind with Dr. Darrach, who kindly sent me the temperature-record. The boy was ill with fever from June 5th to July 19th, and the fever, never very high, gradually left, but even after it had gone the temperature was occasionally above 98.4°. In the beginning the signs of influenza were marked and a few bronchial râles were heard. A brother, eight years of age, was similarly affected. The temperature was, with the exception of some morning temperatures, above normal from January 19th to March 5th, and even then the evening temperature registered at times 99.5°; the highest temperature attained was 103°. The epidemic character of the cases and the bone-pains and other marked influenza-symptoms at the onset tell their true nature.

There is another form of influenza, one in which the catarrhal symptoms affect the stomach and intestines, that it may be difficult to distinguish from the cases of simple fever which are not of influenza-origin. I will cite a case seen a few years since, when epidemic influenza was raging, with Dr. De Young, who has given me the temperature-record he kept, which, as the study of pure instances of the enteric form of catarrhal fever or influenza is rare, especially with reference to temperature, I here reproduce:

CASE III.—The patient was a woman, sixty years of age. She was in perfect health when she was seized with shiverings, fever, bone-pains, and nausea. The tongue quickly became coated, the appetite was entirely destroyed, and vomiting occurred. The urine was high-colored and free from albumin. The bowels were constipated or irregular; there was no jaundice. No chest-symptoms whatever existed, or, indeed, were present at any part of the case, though the respiration was somewhat

<sup>1</sup> Transactions of the Association of American Physicians, 1888, vol. iii.

<sup>2</sup> *Ibid.*, 1887, vol. ii. p. 229.





accelerated. There were great variations in temperature, and while, as a rule, the morning temperature was lowest, the reverse also was noticed.

The temperature sank to 97° F. on the eighth day of the disease, rose to 100° in the evening, fell again to 97° on the ninth day, and from that time on remained subnormal, often below 97°, to the nineteenth day, when it attained the normal. This prolonged subnormal temperature in the slow convalescence, as well as the great variations during the fever, the sudden onset with the marked bone-pains, and the decided gastric symptoms, are very characteristic features of influenza, and, with the knowledge of the prevalence of an epidemic, distinguish its gastro-enteric form from the cases of simple continued fever under discussion.

I pass next to groups of cases which, whatever their origin, must be here considered, namely, cases of continued fever not typhoid, having a duration of several weeks, and found in particular localities, or due to special recognizable causes. The very existence of such cases has been denied. But let me say at once that, with full appreciation of the difficulty of their clear discernment; with the frankest acknowledgment that their study may baffle even the most sagacious physician; with knowledge gained by experience that anomalous typhoid fever will lurk and hide its features completely where it is unsuspected—I still believe in the existence of a continued fever of considerable duration that is not typhoid nor a malarial fever that has become continuous.

But the most common form of simple continued fever, not merely ephemeral, but lasting at times for some weeks, is the fever of the tropics, especially as met with in the West Indies and parts of South America and of India. It is the ardent fever of the older writers; it is, in its more violent form, the inflammatory fever Copland describes as a variety of ardent fever. It has a duration of two weeks, does not occur in epidemics, and, notwithstanding the violent symptoms of intense headache, delirium, flushed face, and full pulse, ends generally in recovery. Death, however, may take place between the sixth and ninth days by coma. With this kind of fever, though differing in intensity, I class the continued thermic fever of Guitéras,<sup>1</sup> observed especially at Key West, and in which wakefulness, great nervous excitement, disordered muscular functions, and unimpaired appetite were common, but in which no eruption nor any of the special symptoms of typhoid fever, nor the characteristic ascending temperature-tracings of the first week were seen. The temperature was often as high on the first day as at any time. In two cases death occurred in the second week with hyperpyrexia. In some of these instances of prolonged fever autopsies were made by Guitéras<sup>2</sup> and the lesions of typhoid fever were not found.

A variety of this continued fever is the one described by Murchison<sup>3</sup>

<sup>1</sup> Therapeutic Gazette, March, 1885. Also, Report of the Sup. Surgeon-General Marine Hospital Service, 1881-85, Washington, 1885, 95-107.

<sup>2</sup> Transactions of the Association of American Physicians, 1887, vol. ii. p. 222.

<sup>3</sup> Treatise on Continued Fevers, p. 681.

as "Asthenic Simple Fever," a fever lasting two or three weeks, with rather feeble pulse, constipation, disturbed sleep, and increasing weakness. It often follows great mental or bodily fatigue, and is never fatal.

A continued fever of remarkable type, in which convulsions as well as chest-symptoms may arise, may be due to starvation. I have described such cases as "Starvation-fever."<sup>1</sup> An autopsy in two instances showed a normal condition of the intestinal glands.

There are other forms of simple fever met with in different localities which may here be inquired into, and which are traceable to special causes. The so-called "Malta Fever" or "Rock Fever," or the fever of the Red Sea ports is one, and, according to Milnes,<sup>2</sup> irregularity of temperature may continue for weeks or months, and rheumatism is not an uncommon complication. Another is the atypical Continued Fever described by Cain<sup>3</sup> at Nashville, and existing also in other parts of the United States, bearing no relation to typhoid fever, and thought to be dependent upon a septic agency arising from the soil. Descriptions of the Cyprus Fever<sup>4</sup> leave a doubt on the mind whether it is not a form of relapsing fever; and Baumgarten's<sup>5</sup> interesting paper on "A Simple Continued Fever" at St. Louis has, chiefly owing to the character of the autopsies in the fatal cases, not dispelled the impression that it was a peculiar form of typhoid fever.

In the diagnosis of these fevers of continued type we have to take great care not only to distinguish them from other idiopathic fevers, but also from prolonged fever that may arise in connection with varied local conditions in which the febrile state, for the time, overshadows the local lesion. To pass the main of these in review: The most likely to be mistaken is the fever of miliary tuberculosis in instances in which the physical signs are not well pronounced. Indeed, the second case reported in this paper was regarded as acute tubercle by most of the many physicians that saw it. As a rule, the greater gravity of the constitutional symptoms, the emaciation, the sweats, the dyspnoea, the tendency to cyanosis, the cough, the signs of a diffuse bronchitis, the frequently present delirium, are conclusive. Still more so is the tubercle-bacillus in the sputum, though its absence in acute tuberculosis is, we well know, not positive proof of this malady not being before us; at times, tubercle-bacilli may be found in the blood when not detected in the expectoration.

Fecal accumulations may give rise to an irritative continued fever of weeks' duration. They are associated with heavily coated tongue and foul breath; often, too, there is some tenderness over the large intestine. The bowels are generally very constipated, but the reverse may happen,

<sup>1</sup> Transactions of the College of Physicians of Philadelphia, Third Series, vol. v.

<sup>2</sup> Lancet, June, 1892.

<sup>3</sup> Southern Practitioner, December, 1891.

<sup>4</sup> Sajous's Annual, 1893, vol. i. H. 92.

<sup>5</sup> Transactions of the Association of American Physicians, 1893, vol. viii.

and then the resemblance, as in a case I saw with Dr. Arthur V. Meigs,<sup>1</sup> is really to typhoid fever rather than to prolonged cases of simple continued fever.

Anæmic fever, such as we sometimes meet with in chlorosis, much oftener in pernicious anæmia, is another form of misleading fever. The look of the patient, the chemical and microscopical blood-tests, explain the irregular pyrexia, which I have seen, however, last several weeks at a time. Temperatures above 103° are extremely rare. The fever that may attend purpura, especially purpura hemorrhagica, is of the same kind; it may be continuous, but it is not high. By way of exception, hysteria is, at times, attended with continuous fever that is likely to show a distinct afternoon rise of temperature. Hysterical fever has been especially studied by French observers. It must be due to a disturbance of the functions of the heat-centres. Osler<sup>2</sup> reports a case that lasted over four years. We can only recognize hysterical fever by the neurotic history and the attending phenomena. There are nervous disorders in which prolonged fever also happens. It may be met with in chorea. In Goodhart's interesting article on "Innominate Fever,"<sup>3</sup> a case of a boy is mentioned who had protracted, irregular fever, and who had had chorea and possibly tetany, and left the hospital, after a six months' stay, with the fever uninfluenced. In all these fevers of nervous origin the temperature is apt to vary very much.

There are further groups of cases of organic change in which fever more or less continuous is observed; in persons, for instance, with rather rapidly advancing arterio-sclerosis, and in lithæmics. Then, too, we see cases in which there is organic disease, as of the endocardium, or of the lung or pleura, or duodenal catarrh, in which the lesion discernible is but slight, but in which, whether from slow absorption of morbid products, or idiosyncrasy of the patient, continuous fever is encountered. In cases of catarrhal pneumonia, or local plastic pleurisies, I have often known this happen. To this group, I think, belongs the case detailed by Chesman Barker,<sup>4</sup> in whose experience fever lasting twenty-two days arose, without apparent cause, after an attack of pleurisy. In further instances, as in Hale White's<sup>5</sup> analysis of Inexplicable Pyrexia, albuminuria was found, and the question is raised whether the lesions are not due to the fever rather than the fever to the lesions. Connolly's<sup>6</sup> forty-four cases of continued fever consequent upon immersion in flood-waters, cannot, I believe, be regarded as idiopathic continued fever, but seem rather to be catarrhal jaundice.

The protracted continued fevers do not happen in epidemics, nor are

<sup>1</sup> Transactions of the College of Physicians, 1886, vol. viii.

<sup>2</sup> Practice of Medicine, second edition, p. 1029.

<sup>3</sup> Guy's Hospital Reports, 1888, vol. xxx.

<sup>4</sup> British Medical Journal, July, 29, 1893.

<sup>5</sup> Ibid., December 4, 1886.

<sup>6</sup> Australian Medical Journal, May, 1893.



there relapses. Recurrences may, however, occur in the acute lithæmic fever, if such I may designate it. I have seen a case in the wife of a physician, with nine or ten attacks in six years, no one lasting over a week, but with very high temperatures, and very scanty urine. The point may well be raised, as the attacks are short, not long, whether, strictly speaking, acute lithæmic fever ought here to be considered.

These continued fevers of long duration are, like the ordinary short simple continued fevers, almost never fatal; the form observed in the tropics has a less favorable prognosis than the other kinds, though there, too, the proportion of deaths is small. No lesions are found except congestion of internal organs. The spleen is not markedly enlarged. Slight meningeal exudation has been occasionally noted. I know of no accurate blood-examinations. It is a mere matter of surmise what, in any of the varieties of the prolonged simple continued fever, causes the fever. That it is due to a disturbance of the heat-centres seems certain. But what gives rise to this disturbance? Is it one cause, or are there several? Leaving out the hysterical cases and those of nervous origin, it appears to me likely that the fever originates from causes within the body; that either as the result of fatigue or overwork, or from impure water, or some preceding digestive disturbance, as happened early in both the very prolonged instances recorded at the beginning of this paper, leucomaines form from vitiated secretions, of a character to disturb the heat-centres. Whether in the continued fever of the tropics heat acts also in this way, or more directly, or through blood-changes produced, is a matter on which we can, with our present knowledge, only speculate. Both here and in all these prolonged continued fevers there is a great field for chemical research, especially in the leucomaines of the uric-acid group.

The treatment of the prolonged simple continued fevers is purely symptomatic. Quinine has no effect on them; nor have the ordinary antipyretics more than a temporary influence. Phenacetin and salol do most good, particularly in cases with headache. They are best given in small doses, a grain or two, frequently repeated, until their effect is manifest. Better still, where it can be efficiently carried out, is the cold-bath treatment, not only to lower temperature, but for its revulsive and alterative influence. I regret that in the extremely long cases first mentioned circumstances prevented it from being thoroughly carried out. Purgatives, unless contraindicated by weakness, always form part of judicious treatment.

## RUPTURE OF THE QUADRICEPS EXTENSOR MUSCLE AND ITS TENDON ABOVE AND BELOW THE PATELLA.

AN ANALYSIS OF 255 CASES WITH REFERENCE TO TREATMENT AND RESULTS.<sup>1</sup>

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IN 1882 Dr. Carl Maydl, of Vienna, called renewed attention to the occurrence of the rupture of the quadriceps by publishing his valuable monograph "Ueber subcutane Muskel und Sehnenzerrissungen" (*Deutsche Zeitschrift für Chirurgie*, Bd. 17 u. 18). In the preparation of this exhaustive paper he thoroughly consulted the literature up to that year and collected 124 cases; 63 in which the rupture occurred above the patella and 61 in which the rupture occurred below the patella.

In 1885 Dr. H. B. Sands (*New York Medical Journal*, December 26, 1885, p. 725) published the results of his careful search through the records of the hospitals in New York City. In this paper he reports thirteen cases of rupture of the ligamentum patellæ and details the case in which he sutured the ligamentum patellæ for an old ununited rupture. This is the first reported case operated upon in New York City.

In 1889 Dr. A. H. Layton (*New York Medical Journal*, April 20, 1889, p. 421) contributed to this subject with a collection of 25 cases. The author of this paper has collected 141 cases in addition to the 124 cases of Maydl, thus making 255 cases for consideration.

The normal function of the extension of the leg is accomplished by the quadriceps extensor cruris. This muscle is made up by the rectus femoris, the vastus externus, vastus internus, and crureus. The rectus arising from the ilium terminates about three inches above the patella in its tendon. This tendon forms the middle portion of the common tendon of the quadriceps, and is inserted on the anterior superior surface of the patella. The vastus externus, arising from the outer aspect of the thigh, terminates in its tendon and forms the outer lateral fibres of the common tendon. It is inserted on the upper half of the outer border of the patella, and prolongs downward a lateral expansion to the capsule of the knee-joint. (Fig. 1.)

The vastus internus arising from the inner aspect of the thigh terminates in its tendon and forms the inner lateral fibres of the common tendon. It is inserted on the inner upper margin of the patella, and also prolongs downward an expansion to the capsule of the knee. The

<sup>1</sup> Read before the Section on Surgery, New York Academy of Medicine.

patella itself is to be regarded as a sesamoid bone developed in the tendon of the quadriceps, and the ligamentum patellæ as the proper tendon of insertion of the muscle, as it is through this tendon that the contractions of the quadriceps are transmitted to the tibia. This ligament is attached to the apex and the lower posterior border of the patella, and is inserted on the tuberosity of the tibia; its lateral fibres are strengthened by the prolongations of the vasti and the fascia.

The loss of the above function may be due to a rupture of the quadriceps above or below the patella or to a fracture through the patella itself. In accordance with the general law that a tendon will tear away a fragment of bone before it will yield itself, it is stated by Tillaux, Maydl, Sands, and others that the rupture occurs most often through the patella; next through the ligamentum patellæ below the patella, and least often through the quadriceps above the patella.

FIG. 1.

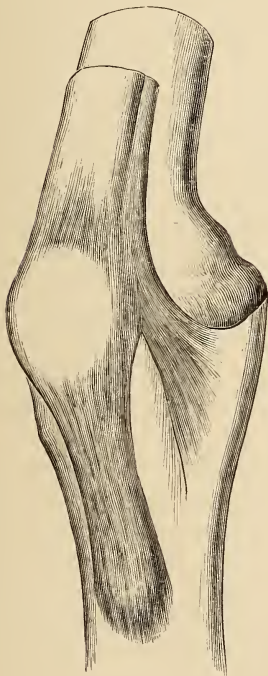


FIG. 2.



Among these 255 cases there were 140 cases in which the rupture occurred below the patella (of these, 8 were incomplete) and 115 cases in which it occurred above the patella (of these, 14 were incomplete).

In regard to the rupture above the patella, which is generally designated as a rupture of the *quadriceps*, it occurred in 91 males and in 7 females; in the remaining 16 cases the sex was not stated.



*Age.* In 32 cases no age was given ; 9 cases were under thirty years ; 28 between thirty and fifty ; and 42 were over fifty years, thus showing a more frequent occurrence as age advances.

*Causation.* In four cases there had been a previous fracture of the patella, which may have served as a predisposing cause ; in 14 cases the cause was not stated ; 75 cases had made a misstep, slipped, and fallen ; in 20 cases it had been due to some other cause. This proves the generally expressed opinion to be true, namely, that this rupture is most frequently due to an *indirect* cause—the violent contractions of the quadriceps—and not to a *direct* cause, which might be true when the rupture was due to an external blow or to a fall upon the knee. The mechanism of this indirect cause may be easily explained. One makes a false step, his foot slips, he loses his balance, his knee is bent forward, while his body is bending backward. In this position, when the leg is partly flexed, the leverage is very much greater than when the extension is complete. Just at this moment of danger the muscles seem to be so stimulated by an instinct for preservation—to prevent the body from falling—that they spontaneously and suddenly contract very violently ; thus there is an intense strain brought to bear upon the quadriceps and its tendons. The patella may be fractured or a rupture may occur, either in the muscle or in its tendon, or at the points of attachment.

*Location.* The rupture occurred about equally upon the right and left sides ; in 15 cases both sides were simultaneously ruptured ; in 29 cases the rupture took place at the insertion of the quadriceps tendon on the patella ; in 13 cases it occurred in the tendon itself ; in 14 cases at the junction of the muscle with the tendon, and in 12 cases the muscle itself was ruptured ; in 44 cases the location was not stated. The more careful observers located the seat of the rupture most often at the patellar insertion.

*Symptoms.* 1. The most frequent and important one is the loss of extension of the leg ; there is an inability to walk after the accident. In some cases, however, this ability to stand and to walk remains ; in these the rupture was probably either incomplete—that is, all the fibres were not ruptured or the lateral prolongation of fascia were unusually strong and so maintained the leg in extension. By a *complete* rupture is meant one extending entirely through all the fibres of the common tendon. Whether this rupture was more often complete or incomplete does not seem to have been definitely stated in the majority of cases ; however, the inference from their histories indicates that the rupture was generally complete. Often the patient hears a loud cracking sound at the moment of rupture.

2. A depression is generally found at the seat of the rupture in which one can place one or more fingers. In partial ruptures this depression

is less. Also after some hours, if there is much effusion, this depression is filled up. This symptom is lost and has an appearance of hydrarthrosis. One must differentiate a severe contusion from a partial rupture. Err on the safe side.

3. The width of this separation between the divided tissues varies; in 17 cases it was less than one inch; in 14 between one inch and one and one-half inches; in 9 cases between two and three inches. In most cases it was less than one and one-half inch.

4. An increased mobility of the patella can be distinguished because its upper attachment is torn away; it can be displaced downward much more freely or moved easily from one side to another.

How often the capsule of the joint is lacerated in this accident can be definitely ascertained only in those cases in which the capsule is opened, as in the sutured cases, and up to the present there have been but few such cases operated upon. Among the 21 cases which were sutured above the patella the capsule was stated to have been opened in 10 cases. Among the 20 cases sutured below the patella 12 were reported to have been opened.

Whenever the rupture occurs at or near (within 5 cm.) the edge of the patella the capsule is generally opened, for above the patella the capsule extends upward behind the rectus tendon 5 cm., while below the patella the anterior wall of the capsule is so closely adherent to the posterior surface of the patellar ligament that if the ligament is completely ruptured and the ends widely separated the capsule must also be ruptured. As it is said that in the larger number of cases the rupture occurred at or near the edge of the patella, so it may be that the capsule is often opened. (Fig. 2.)

Rupture below the patella has been generally described as a rupture of the *ligamentum patellæ*.

*Sex.* It occurred in 111 males and in 11 females; in 18 cases the sex was not stated.

*Age.* 34 cases were under thirty years of age, 55 cases were between thirty-five and fifty-five, and 10 cases were over fifty-five years.

*Cause.* In 17 cases there had been a previous fracture of the patella, which may have served as a predisposing cause; in 19 cases the cause was not stated; 35 cases were due to some other cause, and 86 cases had resulted from a misstep, slip, or fall. Here, again, as above the patella, the largest number were due to an *indirect* cause, the person having slipped and fallen, and its mechanism is the same.

*Location.* The rupture occurred about equally upon the right and the left sides; in 6 cases both sides were simultaneously ruptured; in 25 cases it occurred at the tendon's point of insertion on the patella; and in 31 cases at its insertion upon the tuberosity of the tibia, thus showing a slightly increased tendency for the rupture at this latter location. In

13 cases there were small bony fragments torn away with the ruptured tendon from either the patella or the tuberosity. In only 3 cases did the rupture occur in the middle of the tendon itself.

*Symptoms.* 1. In this location the rupture is generally complete, so that the most frequent and pronounced symptom is the loss of extension. There is an inability to walk or to stand after the accident. There have been reported 8 cases in which the rupture was incomplete, and in these there was no loss of extension; in each case it was assumed that some of the fibres of the ligamentum patellæ remained intact.

2. A depression can generally be made out between the separated ends.

3. This separation was less than one inch in 14 cases; in 26 cases it was between one and one-half inch.

4. An increased mobility of the patella can be distinguished. It can be displaced upward easily. In some cases, in which there are fragments of bone which are torn away, crepitation may be distinguished; the capsule is probably more frequently opened here than above the patella, because of its anatomical arrangement.

*Treatment.* As it has been shown that the mechanism and the loss of function are the same whether the rupture occurs above or below the patella, so it is seen that in both of these classes a similar general plan of treatment is indicated: that is, first to procure a firm union of the structures, and, second, to prevent stiffness or lameness. This may be accomplished either by mechanical or by operative methods.

The mechanical mode seeks to reduce the swelling, to promote absorption, and to prevent any inflammation; to approximate the separated parts by a relaxation of the muscles, and to maintain these parts in apposition, in proper position, by the use of suitably adjusted pads and straps, the leg being preferably supported upon an inclined plane. Finally, to favor early use and to prevent stiffness or lameness by timely massage, electricity, and passive motion.

*DETAILS.* When the patient is in bed upon his back the leg should be raised by the foot, so that a firm, even bandage can be carefully applied from the toes to the hip. Then one should apply a posterior splint, preferably one of wire which can be easily bent, reaching from a few inches above the ankle to near the gluteal fold. Now the main object to be attempted is to approximate and keep in contact the separated ends of the ligament. This can be best accomplished by carefully adjusted pressure upon the patella to keep it in its normal position, but this pressure must be so gradually applied as not to cause any irritation. One must comprehend exactly what has happened and what now is present. There has probably occurred a rupture into the joint, followed by a pouring out of blood, together with a large effusion from the synovial sac into the joint; thus there exist an acute synovitis and



bursitis; therefore no harsh treatment of forcible pressure should be applied, lest the irritation should provoke a destructive suppuration.

When the rupture is below the patella a graduated pad is placed above the patella to prevent it from retracting and to keep it fixed in its normal position. This pad is to be retained in position by a strap of adhesive plaster passing over it, then forward and downward around the lower leg. In case the rupture is above the patella the pad is to be placed below the patella and is secured by a strap passing upward and backward around the thigh. A figure-of-eight bandage is placed over this around the knee.

The leg is then placed upon an inclined plane, as this is a much more favorable position than a horizontal one for relaxing the muscles. The foot should be raised about six to eight inches above the level of the pelvis. An ice-bag should be placed over the seat of rupture. If the rupture is near the joint, the capsule probably has been ruptured, and there has been an effusion. If there is a very large effusion, it is better at once to aspirate rather than to wait for its absorption, which will not only be slow, but also the large clots between the separated ends will prevent an early union, and thus interfere to prolong the recovery.

This aspiration should only be done under absolutely aseptic conditions, otherwise it must not be attempted. After seven to ten days the swelling will have so diminished that the pad and bandages should be readjusted. If the swelling has nearly disappeared, a light plaster-of-Paris bandage may be applied over the others. At the end of four weeks it should be cut away and only a posterior splint applied. Massage and electricity are now to be given to keep up the nutrition of the muscles. The next week the patient should begin to use crutches, and also passive motion, which should be quite gradually increased.

The patient must be careful to avoid any undue strain, which may cause re-rupture during the first three months after the accident, for it has been shown by careful<sup>1</sup> investigations that it requires about ninety days for the effused plastic material to reorganize into a new tendinous structure, which shall be as strong as necessary for the normal functions.

**RESULTS OF MECHANICAL TREATMENT.** These may be grouped into three classes: First, those who made a *complete* recovery; that is, who obtained a return to normal flexion and extension, a freedom from stiffness or lameness, and the ability to go up or down stairs without inconvenience. Second, those who acquired a *useful* leg; here the recovery was not complete, in that there was more or less stiffness and sometimes inconvenience upon going up or down stairs; still, the limb was useful enough to allow the patient to pursue his usual duties. Third, where

<sup>1</sup> Burse; Deutsche Zeitschrift f. Chirurgie, N. 33, p. 30. Enderlin: Arch. f. klin. Chir., xlv. Heft. 3, 563.

the result was *unsatisfactory* owing to the marked lameness or stiffness and sometimes ankylosis, which persisted. The results in the cases where the *quadriceps* was ruptured will first be considered. Among Maydl's 61 cases 56 were complete ruptures and 5 were incomplete. In these 56 cases the end-result was stated in 40 cases. In 24 cases, 60 per cent., complete recovery followed. Nine cases acquired a useful leg. The 7 remaining cases were unsatisfactory.

In regard to the 5 incomplete ruptures the result was not stated in 1 case, but in the other 4 cases the recovery was complete. Less time was required for their recovery than for the complete cases.

Among the writer's 33 cases, 8 were incomplete and 25 were complete; of the latter the end-result was stated in 23 cases. In 16 cases, 70 per cent., complete recovery followed. In 5 cases a useful limb was obtained. The 2 remaining cases were unsatisfactory.

**RUPTURES OF LIGAMENTUM PATELLÆ.** Among Maydl's 63 cases the end-results were stated in 42 cases. In 27 cases, 64 per cent., complete recovery followed. Six cases acquired a useful limb. Seven were unsatisfactory, and 2 had marked ankylosis.

Among the writer's 57 cases 8 were incomplete and 49 were complete; of the latter, the end-results were stated in 36 cases. In 27 cases, 75 per cent., complete recovery followed. Five acquired a useful limb. Two were unsatisfactory, and 2 had complete ankylosis. There have been found but 8 cases of *incomplete* rupture; in 1 case the result was not stated. In 6 cases complete recovery followed; 4 within six months; 1 case obtained a useful limb.

This increase in the percentage of complete recoveries among the writer's cases may be due to the improved modifications in the treatment, as the study of this subject has advanced, and also to the fact that in Maydl's tables the ultimate results were not stated in 17 cases, 30 per cent., whereas in the writer's tables many more of the cases have been traced, so that in only 3 cases, 9 per cent., have the results not been stated.

The two factors which seem to affect the prognosis the most unfavorably are the age of the patient and the increased distance between the separated ends. The older the patient and the wider the separation the less frequently is the recovery a complete one. This ratio becomes much greater when the age exceeds fifty years and the separation is more than one and one-half inches. A comparison between the above tables would seem to indicate that there is a little larger percentage of complete recoveries in the case of rupture of the ligamentum patellæ than of the quadriceps. This may perhaps be explained by the fact that in the treatment it is much more difficult to approximate and to retain in apposition the separated ends of the quadriceps than of the ligamen-

tum patellæ. One cannot easily hold the quadriceps, for it slips away more freely, whereas one can better hold the ligamentum patellæ by the grasp upon the patella.

|                  | Quadriceps. | Ligamentum<br>Patellæ. |
|------------------|-------------|------------------------|
| Maydl . . . . .  | 60          | 64                     |
| Walker . . . . . | 70          | 75                     |

It was observed in the few cases of incomplete rupture, where the structures were still held together by a few remaining fibres, that they were more frequently followed by a complete recovery and that the duration of their treatment was shorter. Hence the surgeon desired to accomplish this same end in the case of complete ruptures by an immediate suture. He succeeded in placing these complete ruptures under even more favorable conditions for an early recovery, in that he was able to ligate the oozing vessels, to remove the clots between the separated ends and thus to approximate and suture the divided structures. Lessening the period during which the leg must remain fixed allows earlier passive motion, which is an especially important factor in producing a complete recovery. For it is a well-recognized fact that the earlier passive motion can be begun after any injury about a joint, the less stiffness will there be and so much more favorable a recovery will follow.

In many cases there is at first more or less ankylosis, which is due partly to the passive contraction of the articular ligaments as a result of the long disuse.

Again, in several cases there has resulted an impairment of function on account of an inefficiency of the quadriceps, which was due to its atrophy and which had followed a too prolonged confinement in bed with absolute quiet. In most cases this stiffness and atrophy would not have persisted if passive motion had been earlier employed.

As it is only within the last few years that the operative treatment has been employed, so there are but few cases to be considered. One cuts down to the seat of the rupture, secures, approximates, and unites the separated structures by sutures of silkworm-gut, catgut, kangaroo tendon, or silver wire, the incision is closed with or without drainage, and the limb placed upon an inclined plane for ten to fourteen days. At the end of two to three weeks massage, electricity, and passive motion are begun and gradually increased.

*Results of the operative method in the case of the quadriceps:* There have been 21 cases of this rupture so treated; 19 cases, 90 per cent., made a complete recovery; 12 within three months and 7 within six months. The time was not stated in 1 case. In 1 case the result was doubtful, "four months only slight power of extension;" in this case the joint was opened and the patella fractured. There was no mortality



nor any other complications. In 10 the capsule was found to have been opened; in 12 catgut was used for the suture; in 1 silver wire; in 5 silkworm-gut. In 4 cases drainage was used, and in 5 other cases no drainage was employed. These 9 cases each recovered in about equal periods of time.

*Results* in the cases of the ligamentum patellæ: There have been 20 cases thus treated, and in 16 cases, 80 per cent., complete recovery followed; 8 within three months and 3 within six months. In 5 the time was not stated. There was only 1 case of ankylosis, which occurred in 1839; this patient fell upon a scythe and the joint was opened. The early preaseptic date accounts for the ankylosis. There has been no mortality.

In 12 cases the capsule was opened. For the suture, 4 used catgut, 6 silver wire, 4 silkworm-gut. Drainage was used in 4 cases, and in 4 cases it was not used. All cases recovered in about equal periods.

Thus the writer has tabulated 41 cases treated by operation, with 35 cases, 86 per cent., of complete recoveries; in the 6 other cases the results were not stated, but their histories would indicate that they also recovered.

**SUMMARY.** 1. The patella is to be considered as a sesamoid bone developed in the tendon of the quadriceps, and the ligamentum patellæ as the proper tendon of insertion of the muscle.

2. The rupture occurs about equally above and below the patella, is generally complete, and causes an entire loss of function. In a small number of cases the rupture is incomplete, and here loss of function may not follow.

3. The rupture is most often due to an indirect cause, as slipping or falling, and occurs more frequently between the ages of forty and fifty.

4. Its seat of location is most often at or near the tendon's insertion on the patella or on the tuberosity of the tibia. The patella becomes more freely movable and a depression is found in recent cases between the separated structures. The amount of separation varies, increasing when the leg is flexed and diminishing when the leg is extended; it is generally less than one and one-half inch.

5. In summarizing the best results of the *mechanical* treatment we find that 70 per cent. of the cases of rupture of the quadriceps made a complete recovery. Of these 18 per cent. recovered in three months; 31 per cent. in six months; and 50 per cent. in one year. In regard to the rupture of the ligamentum patellæ 75 per cent. made a complete recovery, and of these 7 per cent. recovered in three months, 33 per cent. in six months, and 63 per cent. in one year.

6. Under the *operative* method an earlier recovery followed; in the case of the quadriceps 90 per cent., and of these 56 per cent. recovered

within three months and 100 per cent. in six months. In the case of the ligamentum patellæ 80 per cent. recovered; of these 50 per cent. in three months and 100 per cent. in six months.

In comparing the averages we find that under the mechanical mode 72.5 per cent. recovered completely, 12.5 per cent. in three months and 32 per cent. within six months. Whereas under the operative method 86 per cent. recovered completely; 50 per cent. within three months, and 100 per cent. within six months. Thus, under the operative method there has been not only a much larger percentage of complete recoveries, but also the duration of the treatment has been very much shortened without being followed by any increased danger of mortality in the hands of the skilled surgeons.

CONCLUSIONS. 1. In recent cases where there is not much effusion and the joint is apparently not opened, where the separated ends can be approximated and detained by suitably adjusted pads, the mechanical treatment may be carefully considered. In the hands of the intelligent general practitioner this method may be expected to bring about a complete recovery in the larger number of cases. From nine to twelve months will be required to re-establish fully the normal functions.

2. A too prolonged fixation in bed is unfavorable to an early recovery, therefore early massage and passive motion are strongly advised.

3. The skilled aseptic surgeon who primarily resorts to the operative method in suitable cases (but the age and vitality of each patient must be most carefully considered) may quite reasonably hope to obtain a better result in a larger number of cases and save his patient three to six months' time.

Catgut, kangaroo tendon, or silkworm-gut should be used, and when there is much effusion drainage should also be employed.

4. When the separation is greater than one and one-half inch or when the case has not recovered under the mechanical treatment, the operative is indicated.

5. As the length of time required for treatment is a very important consideration, so the operative method, which has diminished this period and also succeeded in a larger number of cases without increasing the danger, will be more often indicated and more frequently applied in the hands of the skilled surgeon.

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A STUDY OF THE BLOOD IN GENERAL PARALYSIS.<sup>1</sup>

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SINCE attention has been given to the study of the blood in general a number of observers have written upon the blood in the insane; and more particularly is this true with reference to general paralysis, partly because of its frequency and partly because the diagnosis can be made with greater definiteness in this than in most other forms of mental disease.

As early as 1846 Erlenmeyer<sup>2</sup> made investigations upon the globules and fibrin of the blood in the insane, finding an increase in either to be rare.

Hittorf<sup>3</sup> in 1847, also arrived at the conclusion that in mania there is a diminution in the number of red globules and fibrin, and that the blood is in a watery condition.

To Michea<sup>4</sup> (1848) belongs the credit of having first studied the blood in general paralysis, in which he noted an increase in the globules. He also speaks of a change in the character of the blood in convulsions and cataleptic seizures, though what this change is he does not say.

Sutherland<sup>5</sup> (1873) considered a great increase in the white cells and an absence of rouleaux-forming power as an indication of low vitality with a grave prognosis. He found a leucocytosis in the insane generally, but most marked in general paralysis.

The conclusions of Voisin<sup>6</sup> (1879) on the condition of the blood in general paralysis are more interesting historically than of actual value. He states that the blood of general paralytics spreads on a cover-glass with less pressure than normal blood; that the red cells make peculiar rouleaux with white corpuscles between them; that the coagulability is greater; that in the last stages in some cases vibrions and bacteria appear.

MacPhail<sup>7</sup> (1884), in his valuable contribution on the blood of general paralytics, studied the subject more thoroughly and with better apparatus than any of his predecessors. In fifteen cases examined he found the hæmoglobin low on admission, higher in the quiescent period, and

<sup>1</sup> From work done in the laboratory of McLean Hospital under the supervision of Dr. Edward Cowles.

<sup>2</sup> Quoted by Dagonet, in *Traité des Maladies Mentales*, 1894, p. 103.

<sup>3</sup> Quoted in Bucknill and Tuke's *Psycholog. Medicine*, 4th ed., p. 597.

<sup>4</sup> *Recherches cliniques sur le sang dans les névroses*. Rev. in *Zeitschrift für Psychiat.*, vol. v. p. 485.

<sup>5</sup> "On the Histology of Blood in the Insane." *Journal of Ment. Scien.*, vol. xxxi. p. 147.

<sup>6</sup> *Paralyse General des Alienes*, 1879, p. 160.

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low again during the paralytic stage. The red corpuscles "deteriorat" in quantity and quality coincident with the progress of the disease; "small granule-cells" are not present in the last stage; the relative proportion of white to red corpuscles is increased, and this increase is likewise coincident with the progress of the disease.

Lewis<sup>1</sup> (1889) observed practically the same condition in a series of cases of general paralysis, namely, a reduction in the hæmoglobin and number of red corpuscles and an increase in the white. In 7 of 21 cases, however, the white count was 10,000 or under, while in a few the leucocytosis was very marked.

Smyth<sup>2</sup> (1890), in his analysis of 40 cases, states that the hæmoglobin in general paralysis is within physiological limits, though it may be very high in the exalted stage of the disease. There was much less falling off in the red corpuscles than in other forms of insanity. The specific gravity he found increased.

D'Abundo<sup>3</sup> (1891) has experimented upon the toxicity of the blood in the insane, and has demonstrated that the blood of general paralytics injected into animals is more toxic than normal blood.

According to Winckler,<sup>4</sup> the hæmoglobin and red corpuscles in general paralysis vary with the body-weight, the hæmoglobin, however, diminishing more than the red cells. They both decrease in the early stage, are stationary in the so-called second stage, and fall again in the third. He noticed, along with a fall in body-weight, that a paralytic attack has a deteriorating influence on the blood.

Agostini<sup>5</sup> has investigated the "isotonia" of the blood, or the power of resistance of the globules to solution. In typical general paralysis the isotonia is little altered, and the hæmoglobin and red cells usually normal, while all are diminished in periods of long excitement. During apoplectiform attacks the isotonia is reduced, with but little change in the hæmoglobin or red corpuscles.

The earliest attempt to study the variety of leucocytes was made by Krypiakiewicz,<sup>6</sup> who devoted his attention to the eosinophiles. He observed no increase in these cells in any case or in any stage of the disease. The variation in the eosinophiles was between 1 and 5 per cent., and was without relation to any peculiarity, course, or stage of the disease; they never entirely disappear from the blood. In some cases the leucocytes were sufficiently increased to justify the name of leucocytosis.

<sup>1</sup> Text-book of Mental Diseases, p. 287.

<sup>2</sup> Journal of Mental Science, vol. xxxvi. p. 504.

<sup>3</sup> "Sull' azione tossica e battericida del siero di sangue dei Pazzi." Rivist. speriment. di Freniatria, vol. xvii. F. iv. and vol. xviii. F. 2, p. 322.

<sup>4</sup> "Über Blutuntersuchungen bei Geisteskranken," Inaug. Dissert., 1891, Bonn, p. 39.

<sup>5</sup> "Sulla isotonia del sangue negli alienati." Rivist. sperim., vol. xviii. F. 3 and 4, p. 492.

<sup>6</sup> Einige Beobachtungen über das Blut der Geisteskranken. Wien. mediz. Wochenschrift, Nr. 25, 1892.



The hæmoglobin and red corpuscles were diminished, and there was poikilocytosis.

Zappert<sup>1</sup> (1892) reports two cases of general paralysis in which the red corpuscles were decreased, the leucocytes normal, and the eosinophiles slightly below the normal number.

Excitement and motor restlessness in general paralysis were found by Vorster<sup>2</sup> to cause a lowering of the specific gravity and hæmoglobin. Sometimes after paralytic attacks an increase in specific gravity and hæmoglobin was observed, but following light attacks no change took place. These alterations had no relation to the temperature.

Houston<sup>3</sup> gives the result of the blood-examination in four cases of general paralysis; in all the hæmoglobin and red corpuscles were below normal. The white corpuscles he considered, without counting them, about normal.

Roncoroni,<sup>4</sup> in his study of the leucocytes in general paralysis, was concerned only with the eosinophiles. These he found to vary, at times very scarce, rarely in normal frequency, in extremely agitated cases with a tendency to violence they increase from 8 to 18 per cent., and, in one instance, even to 25 per cent. of the total number of leucocytes.

More recently Burton<sup>5</sup> has published his results in four cases of general paralysis. The red corpuscles averaged 5,177,500, the white 10,250, and the hæmoglobin 73 per cent. The differential counts are of little value, no percentages being given.

From the foregoing we see that all observers are almost unanimous in finding the red corpuscles and hæmoglobin either normal or decreased, except in excitement or after a paralytic attack. The specific gravity has been investigated by only two men, one of whom claims that it is always high in general paralysis; the other, that it becomes so after some paralytic attacks. By all who accurately counted the white corpuscles an increase was noted except by Zappert, who made but two observations, and Burton, who made four; both found the number about normal. Very little has been done in making differential counts of stained specimens, since Krypiakiewicz, Zappert, and Roncoroni were only interested in the eosinophiles, and Burton gives no figures whatever.

<sup>1</sup> "Über das Vorkommen der eosinophilen zellen in menschlichen Blut." *Zeitschrift für klin. Medicin.*, Bd. xxii. H. 3 and 4.

<sup>2</sup> "Über d. Hæmoglobingehalt u. d. spec. Gewicht des Blutes bei Geisteskrank." *Allgemeine Zeitschrift für Psychiatri*, 1894, Bd. xv. H. 3 and 4, p. 740.

<sup>3</sup> "On the Examination of Blood in the Insane." *Bost. Med. and Surg. Journ.*, Jan. 18, 1894.

<sup>4</sup> "Studi sui leucociti nei Pazzi." *Archiv di Psichiat. Scienze*, etc., 1894, vol. xv. F. iii. p. 293.

<sup>5</sup> "The Blood in the Insane." *Am. Journ. of Insanity*, 1895, vol. li. p. 495. We cannot refrain from criticising the inaccuracy of statement in this article, *e. g.*, the classification of lymphocytes and large mononuclear cells under the head of neutrophils; the statement that the leucocytes are "markedly decreased" in general paralysis, when his average was 10,250 and in no case fell below 9000; the statement that no mononuclear cells were present in one case, the illustration of which plainly shows several of both large and small varieties.

In the light of these facts it seemed very desirable to examine the blood in all these particulars at the same time; and not only once in each case, but to follow each through the various phases of the disease over as long a period as possible, to see what changes, if any, take place, and whether the presence of certain mental and physical symptoms is attended by any constant alteration in the blood.

*Methods.* To obtain the blood the lobe of the ear was pricked with a fine-pointed lancet after the skin had been cleansed with alcohol. The corpuscles were counted with the Thoma-Zeiss apparatus, Toison's solution being used to stain the white corpuscles in a dilution of 1 to 100. For estimating the red corpuscles, with but few exceptions, 50 squares were counted in never less than three drops, or 150 squares in all. The whole ruled area was counted for leucocytes in four different drops, except in four instances, frequently in more when there was much disparity between the several results. Considerable time was saved by employing two or three counters.

The hæmoglobin was taken with Fleischl's hæmometer, and the average of four readings obtained in each case.

For determining the specific gravity, Hammerschlag's<sup>1</sup> method was used of suspending a blood-drop in the middle of a cylinder containing a mixture of benzol and chloroform, the specific weight of this mixture being that of the blood.

Cover-glass preparations were then dried for several hours in a thermostat at a temperature of 100° C. and stained with Ehrlich's triple stain, as modified by Gollasch and Biondi, and a differential count made of 1000 leucocytes in nearly every instance.

The absolute number in a cubic millimetre was calculated for the sake of clearness. A Leitz mechanical stage was found to be of great convenience and value in traversing a large area without recounting any field as well as for locating cells for future reference. The lens was a Zeiss 1/12" oil immersion with a No. 6 compensating ocular.

The classification is essentially that of Ehrlich.

1. Lymphocytes, as large or somewhat larger than the red corpuscles, with a round, deeply stained nucleus almost filling the cell-body.

2. Large mononuclear leucocytes, of greater size, with a large nucleus faintly stained. The protoplasm is more abundant than in the lymphocytes, and is without granulations.

3. Transitional<sup>2</sup> forms, including those cells which in the evolution of the large mononuclear into the neutrophile cells with polymorphous

<sup>1</sup> Described by von Limbeck in *Grundriss einer Klin. Path. des Blutes*, 1892, p. 9.

<sup>2</sup> Ehrlich's definition takes in all the large mononuclear forms with indented nuclei without reference to the affinity of the protoplasm for coloring-matter. Ouskow lays more stress on the color of the protoplasm. (See review by Thayer, *Johns Hopkins Hosp. Reports*, 1894, vol. iv. No. 1, p. 102.)

nuclei, have not only irregularly shaped nuclei, but some evidence of beginning granulation in the protoplasm.

4. Polymorphonuclear neutrophiles (polynuclear neutrophiles), with nuclei of various shapes and having a protoplasm filled with neutrophilic granulations.

5. Eosinophiles, cells with polymorphous nuclei, but containing large granulations staining with eosin or acid fuchsine.

Excluding those taken in cases with convulsions, nearly all the specimens of blood were obtained between 3 and 5 P.M., or from two and one-half to four and one-half hours after dinner. The time of day is important, especially in its bearing upon digestion leucocytosis. Rieder<sup>1</sup> states that after a proteid diet there is, in most persons, an increase in the white corpuscles, which reaches its maximum from three to four hours after eating, and on an average is about 33 per cent. above the normal count. Reinert's<sup>2</sup> conclusions are practically the same.

Nearly all the following examinations, therefore, were at a time when digestive leucocytosis is active. To ascertain what the physiological leucocytosis amounts to, and by learning our own personal equation to have a basis for comparison, blood-specimens were obtained from ten male adults in health at the same length of time after eating. These persons were nurses and others living in the hospital, with diet similar to that of the patients.

From the table one can see that the red corpuscles and hæmoglobin are about in the proportions commonly accepted. The normal specific gravity is not so well determined, variations depending on the method, age of individual, and probably also on the time of day. Smyth, in the work referred to above, took as his normal 1056, which is certainly much lower than most recent observers have found it in adult males. Hamerschlag<sup>3</sup> obtained a range from 1056.5 to 1066, with an average of 1060.5. Perhaps our result is made a little higher through the influence of meals.

The average number of leucocytes is decidedly above the normal as given by most authors, but not high considering the effect of digestion.

An important thing to observe in the differential count is that in spite of the wide variations in the number of leucocytes in these cases, the proportion of the cellular elements to each other does not change materially. In other words, in the leucocytosis following proteid digestion the relation of the polymorphonuclear to the mononuclear cells remains the same,<sup>4</sup> a fact that distinguishes it from the inflammatory leucocytoses. The eosinophile cells, according to Rieder,<sup>5</sup> tend to diminish in all leucocytoses, whether physiological or pathological.

<sup>1</sup> Beitrge zur Kenntniss der Leukocytose, 1892, pp. 58 and 201.

<sup>2</sup> Die Zhlung der Blutkörperchen, 1891, p. 95.

<sup>3</sup> Cited by Vierordt in his "Daten und Tabellen," 1893, p. 126.

<sup>4</sup> Rieder, Beitrge zur Kenntniss der Leukocytose, 1892, p. 65.

<sup>5</sup> Loc. cit., p. 65.



## NORMAL.

| Case.          | Date.  | Hour.      | No. fields<br>of white<br>counted. | No. squares<br>of red<br>counted. | White. | Red.      | Sp. gr. | Hb. | Lymphocytes. |                            | Large mono-<br>nuclears. |                            | Transitional. |                            | Neutrophile<br>polymorpho-<br>nuclear. |                            | Eosinophiles. |                            |
|----------------|--------|------------|------------------------------------|-----------------------------------|--------|-----------|---------|-----|--------------|----------------------------|--------------------------|----------------------------|---------------|----------------------------|----------------------------------------|----------------------------|---------------|----------------------------|
|                |        |            |                                    |                                   |        |           |         |     | Per ct.      | Abs. No.<br>in<br>1 c. mm. | Per ct.                  | Abs. No.<br>in<br>1 c. mm. | Per ct.       | Abs. No.<br>in<br>1 c. mm. | Per ct.                                | Abs. No.<br>in<br>1 c. mm. | Per ct.       | Abs. No.<br>in<br>1 c. mm. |
| No. 1          | Jan. 5 | 4.40 P. M. | 6                                  | 150                               | 10,500 | 5,101,000 | 1065    | 102 | 17.5         | 1837                       | 8.5                      | 872                        | 1.4           | 147                        | 70.5                                   | 7,402                      | 2.1           | 220                        |
| " 2            | " 9    | 4.30 "     | 6                                  | 150                               | 7,160  | 5,000,000 | 1056    | 96  | 27.6         | 1976                       | 7.1                      | 508                        | 3.7           | 265                        | 58.8                                   | 4,210                      | 2.8           | 200                        |
| " 3            | " 15   | 4.15 "     | 6                                  | 150                               | 9,650  | 5,314,000 | 1062    | 98  | 18.4         | 1775                       | 6.9                      | 666                        | 2.0           | 193                        | 71.5                                   | 6,900                      | 1.2           | 115                        |
| " 4            | " 23   | 4.00 "     | 7                                  | 150                               | 7,430  | 5,452,000 | 1064    | 101 | 25.2         | 1872                       | 5.0                      | 371                        | 1.2           | 89                         | 66.7                                   | 4,956                      | 1.9           | 141                        |
| " 5            | Feb. 2 | 4.15 "     | 6                                  | 150                               | 14,800 | 5,248,000 | 1063    | 103 | 22.6         | 3344                       | 3.9                      | 577                        | 1.6           | 237                        | 69.2                                   | 10,241                     | 2.7           | 400                        |
| " 6            | " 26   | 4.30 "     | 6                                  | 150                               | 10,160 | 5,144,000 | 1063    | 85  | 20.6         | 2063                       | 4.6                      | 467                        | 0.5           | 51                         | 72.1                                   | 7,325                      | 2.2           | 223                        |
| " 7            | Mar. 4 | 3.30 "     | 7                                  | 150                               | 10,700 | 5,300,000 | 1063    | 97  | 17.0         | 1819                       | 5.2                      | 556                        | 0.5           | 53                         | 76.9                                   | 8,228                      | 0.4           | 43                         |
| " 8            | " 7    | 3.45 "     | 6                                  | 150                               | 11,160 | 4,500,000 | 1062    | 98  | 21.2         | 2366                       | 4.5                      | 502                        | 1.1           | 122                        | 71.2                                   | 7,946                      | 2.0           | 223                        |
| " 9            | " 8    | 3.30 "     | 6                                  | 150                               | 11,500 | 5,212,000 | 1061    | 103 | 20.4         | 2346                       | 5.0                      | 575                        | 1.7           | 195                        | 69.6                                   | 8,004                      | 3.3           | 380                        |
| " 10           | " 11   | 3.30 "     | 6                                  | 150                               | 7,000  | 5,040,000 | 1060    | 99  | 26.4         | 1848                       | 4.6                      | 322                        | 1.8           | 126                        | 66.2                                   | 4,634                      | 1.0           | 70                         |
| Averages . . . |        |            | 6+                                 | 150                               | 10,006 | 5,131,000 | 1062    | 98  | 21.69        | 2127                       | 5.53                     | 543                        | 1.55          | 148                        | 69.27                                  | 6,985                      | 1.96          | 201                        |

Throughout this paper the results in these healthy individuals will be taken as a basis for comparison, since they were examined under as nearly as possible the same conditions as the paralytics.

CASE I.—S. E. S., aged thirty-five years, married, admitted October, 1892. No heredity. Since having influenza two years ago has been nervous and irritable. Has always overworked. Pupils unequal, talks slowly, tremor of tongue and hands, knee-jerks absent, Romberg's symptom, well-developed delusions of wealth, excited, unreasonable, and extravagant. When the blood was first examined, ataxia and dementia were very pronounced, and he was having convulsions at frequent intervals.

Upon studying the table it is evident that the red corpuscles are about normal and the specific gravity and hæmoglobin diminished. There is a leucocytosis amounting to 35 per cent. above the normal. The differential count shows that this lies chiefly in the polymorphonuclear cells, the lymphocytes falling relatively and absolutely. The relative increase in the large mononuclears is greater than in any other element. No abnormal variation is present in the eosinophiles. These examinations were made at a time sufficiently distant from convulsive seizures to be little if at all influenced by them, the nearest being 14 hours after a light attack. During the nine months over which the examinations were made not much change in the blood took place save a slight drop in the red corpuscles and specific gravity.

CASE II.—F. E. C., aged thirty four years, admitted in October, 1892. Syphilis ten years ago. For several months previous to entrance made business blunders and was absent-minded. Impairment of moral sense, restless, and at times violent, extravagant ideas of grandeur and power. Speech imperfect, staggering gait, writing faulty, knee-jerks increased. Later on he became more paralyzed and demented, losing control of the voluntary muscles. At one time he had a convulsion. Died October 13, 1894.

A general reduction in the red corpuscles, specific gravity, and hæmoglobin is apparent. The augmentation in the leucocytes is too slight to be considered abnormal. Aside from the increase in the polymorphonuclear neutrophile cells, the differential count reveals a low number of lymphocytes.

CASE III.—J. N., aged fifty years, admitted December, 1889. No heredity. Naturally of a nervous temperament. A change in character was first noticed eighteen months before entering the hospital. Memory poor. Grand ideas of his own greatness and importance. Delusions of wealth, emotional. Inequality of pupils, fibrillary tremor of tongue, Romberg's symptom present, knee-jerk absent. Subsequently was suspicious, and acquired delusions and hallucinations of sight. Ataxia of gait and dementia. Died October 20, 1894.

The red corpuscles are apparently little affected; the specific gravity and hæmoglobin are both subnormal. The leucocytes are most interesting; with but one deviation the number steadily rises as the termination of the disease draws near. This agrees in part with the conclusion of McPhail<sup>1</sup> that the increase in the white corpuscles is coincident with the progress of the affection, but later observations fail to bear it out. With this progressive leucocytosis the absolute number of the different varieties remains practically stationary excepting that of the polymorphonuclear cells, in which alone the increase takes place.

CASE IV.—C. C. B., aged forty-two years, married, admitted April, 1892. The onset was sudden. Three days ago became excited, talked loudly, and acted in an unusual manner, doing many senseless things. Has extravagant schemes. Pupils react sluggishly to light; tongue shows a fibrillary tremor; twitching of facial muscles; speech often hesitating, words being repeated. Knee-jerks diminished. Romberg's symptom present. The physical and mental condition grew constantly worse, as manifested by his unsteady walk and dementia.

This is a man in the demented stage who underwent comparatively little change in the nine months during which the blood was taken, although the disease had progressed rapidly prior to this.

The hæmoglobin, always below normal, was as high at the end as at the beginning. The specific gravity was not far from the normal and was quite constant. In the red corpuscles there is a considerable loss. The average of white corpuscles gives a gain of about 20 per cent. over the normal average, but the variation at different times has no especial relation to any state of mind or body. In the differential count one notices a diminution in the lymphocytes and a rise in the large mononuclear and polymorphonuclear cells. The eosinophiles are within physiological limits.

CASE V.—F. C., aged forty-three years, married, admitted September, 1893. Dissipated in his youth. A year before admission he had an attack of speechlessness without loss of consciousness, which was followed by others of a similar nature. For many months has been irritable and unreasonable. Memory poor. Delusions. Hallucinations of hearing and sight. Fine tremor of tongue, slurring of syllables, tremor of lips and facial muscles. Knee-jerks absent. Romberg's symptom present. At times ataxia of gait and mental confusion. April 22, 1895, died in an apoplectic seizure.

The red corpuscles are below the standard, and a tendency can be detected to decrease with the advance of the disease. Both the specific gravity and hæmoglobin are diminished constantly. The leucocytes are slightly increased and do not fluctuate in the course of the disease to any extent except in one instance, where the leucocytosis reached

<sup>1</sup> Loc. cit.



18,000. This unexpected result at once brought up the question of cause. Three days previous he had an apoplectic attack with subsequent paralysis of the face and inability to articulate, the temperature being  $104^{\circ}$ . At the time of the blood-examination the temperature had fallen to  $100^{\circ}$ . Had this marked increase in the leucocytes, specific gravity, and hæmoglobin any dependence on the seizure? A relation of cause and effect was more strongly suspected on finding, three days later, the blood had recovered its usual condition, and with this clew further and more systematic examinations were made later on. In the production of the leucocytosis the polymorphonuclear neutrophils and the lymphocytes both play an important part, but the large mononuclear cells are relatively most increased. The average of the other counts shows only a little drop in the lymphocytes and a rise in the number of large mononuclear cells.

CASE VI.—W. H. P., aged forty-nine years, admitted February, 1894. Overwork. For five years past his friends have noticed an unnatural nervousness and irritability of temper. There is a history of a "fainting spell," for which he was in bed several days. Delusions of wealth and grandeur, memory poor, sense of propriety impaired. Pupils do not react to light. Fibrillary tremor of tongue and muscles of the face. Articulation faulty. Romberg's symptom, inco-ordination, ataxic gait. Knee-jerks absent.

Following these examinations over a period of eight months we find the specific gravity quite unchanging throughout, and a steady decrease in the hæmoglobin and number of red corpuscles. The leucocytosis, always present, is sometimes very pronounced, at other times small. Unlike some of the preceding cases, the late counts were lower than the early ones. The absolute number of lymphocytes is nearly normal, that of the polymorphonuclear neutrophils considerably increased, while the large mononuclears are more than doubled.

CASE VII.—M. W. C., aged forty-six years, married, admitted March, 1894. Heredity in family. Syphilis twelve years ago. Has always overworked. About two months since formed delusions of possessing a great fortune, was confused, and sometimes violent. Now more quiet and contented. Does not appreciate his condition or whereabouts. Pupils unequal. Knee-jerks much decreased. Romberg's symptom. Speech slow and hesitating, ataxia of gait. Died January 6, 1895, after a hemiplegia followed by convulsions that recurred frequently until his death.

The only noteworthy deviation from the normal is in the number of white corpuscles, which are decidedly increased. This increase is entirely in the neutrophilic polymorphonuclear cells.

CASE VIII.—A. F. S., aged thirty-two years, admitted July, 1894. Naturally a keen man, he became a year ago less attentive to business and gave it up. More recently wandered away from home in

a state of mental confusion. Memory for recent events much impaired. Judgment and power of attention poor. Tremor of tongue and lips. Articulation decidedly defective. Knee-jerks increased. Marked ankle-clonus, inco-ordination of movement.

This case is of interest because seen in the early stage, soon after his entrance into the hospital. A general diminution in the red corpuscles, specific gravity, and hæmoglobin is apparent. There is no leucocytosis; in fact, the count is below the average normal. The count of stained specimens is essentially a normal one.

CASE IX.—J. M. R., aged forty-three years, married, admitted March, 1894. Syphilis eight years ago. For seven months has been nervous and depressed. Afterward became exhilarated and developed delusions of wealth and grandeur. Moral sense apparently lost. Memory poor. Emotional. Tremor of tongue and lips. Speech hesitating. Romberg's symptom. Knee-jerks diminished. Handwriting characteristic with omissions of letters and words. At the period when the latter observations were made he was breaking down very rapidly.

We have here a good example of the general paralytic who runs a rapid course, the mental and physical impairment being more marked at each successive examination. The red corpuscles and hæmoglobin show a tendency to decrease. In contrast to the previous cases the specific gravity is never below the normal, and at times is extremely high. Speaking roughly, the specific gravity is higher during periods of motor excitement than at other times, but the correspondence is neither constant nor accurate.

The leucocytosis is always of fair proportions, and at one time even reached 20,000. This was taken when the mental and physical disturbance had attained its climax, and the degree of excitement and confusion was more pronounced than at any other examination. The polymorphonuclear neutrophiles make up the greater part of the excess of leucocytes, but relatively the large mononuclears increase much more, their actual number sometimes being three times the normal. The lymphocytes are low throughout. At the beginning the eosinophiles were more numerous than afterward. It is worth mentioning that the eosinophiles were fewest when the leucocytosis was greatest.

CASE X.—G. P. E., aged thirty-five years, admitted February, 1894. Syphilitic history questionable. After a period in which he was irritable and forgetful, he became excited and showed marked delusions of grandeur. On admission, pupils unequal and facial tremor. Diminished knee-jerks. During the subsequent year he progressed to profound dementia with great impairment in speech and gait.

A feature in the analysis of this case is the evenness of the various examinations, not only in the leucocytes, but in the red corpuscles, hæmoglobin, and specific gravity as well. The last three are diminished, the white corpuscles above normal. His condition at the several times of observations was very similar except on November 8th, when he was

declining with unusual rapidity. The leucocytes alone were affected, reaching 13,500. In the differential count the lymphocytes, as usual, were abnormal. The eosinophiles were at all times very high, but without apparent relation to any physical or mental condition.

CASE XI.—C. F., aged fifty years, admitted March, 1894. No syphilis. Drank alcohol freely. Disease began rather abruptly with failure of memory and thickness of speech. This was soon followed by unsteadiness of gait, delusions of grandeur, and excitement. Pupils unequal, react slightly to light. Fibrillary tremor of tongue and face. Knee-jerk diminished. Steady progress during the year to high-grade dementia.

All the observations were made in the stage of contentment and physical well-being. The blood is quite normal, save a low percentage of hæmoglobin. The analysis of the white corpuscles shows a fall in the lymphocytes with a great rise in the large mononuclear cells.

CASE XII.—A. G., aged forty years, admitted November, 1894. No syphilis. Violinist. For a number of months before admission it was noticed that he was losing his skill in playing, that his speech was affected, and that he was careless in keeping appointments. Three weeks previous to entrance became extravagant and excited. Full of schemes. Tremor of tongue and face, slurring of speech, slight inequality of pupils and slow reaction to light. Since then has failed steadily in mind and body, and has frequently been very restless. Is demented and easily excited.

This patient was followed along from the excited stage at the beginning, with restlessness and incessant talking, to the later period of quiet and contentment. No change in the blood coincident with the alteration in the mental condition can be discovered aside from a fall in the hæmoglobin. The range of the specific gravity is physiological and the red corpuscles likewise. A constant leucocytosis is present of fairly high grade, in which the lymphocytes and transitional cells are normal and the polymorphonuclears increased, but much less relatively than the large mononuclears and eosinophiles, both of which in actual numbers are more than doubled.

CASE XIII.—S. A. H., aged sixty years, admitted January, 1894. For a year previous to admission slight mental changes, slight tremor of face, and slight slowing of speech. Later became depressed and was brought to the hospital profoundly melancholy. There was marked tremor of face and tongue, increased knee-jerks, and Romberg's symptom. With the depression some delusions of grandeur—he is the “king of sinners.” He failed mentally and physically with extreme rapidity and died four weeks after admission.

Unfortunately, but one specimen was obtained in this case, which was of such short duration. When the blood was taken three days before death, the patient was in bed with a temperature of  $100.4^{\circ}$ . The blood is evidently concentrated since the specific gravity, hæmoglobin, and red corpuscles are very high for a man pale and emaciated as he



was. A distinct leucocytosis was found, consisting chiefly of polymorphonuclear neutrophile cells.

CASE XIV.—F. W., aged forty-four years, admitted January, 1894. History of syphilis and excesses. Optic atrophy for eight years. For six months before admission, irritable, forgetful, and unmanageable. On admission, confused, apprehensive, suspicious, hallucinations and delusions, emotional. Pupils unequal, reaction to light slow. Tremor of tongue, speech slurring, knee-jerks absent. One fainting attack in which he became very pale. In September, restless and noisy, since then more quiet and happy, failing mentally. On April 1st had a small bed sore with slight discharge. April 12th, bed sore healing, no discharge. May 1st, bed sore well.

The red corpuscles, hæmoglobin, and specific gravity are all somewhat diminished, but are not affected particularly at any period of the disease. The leucocytosis, though sometimes inconsiderable, is fairly constant; it attains a maximum of 14,500 at a time when the patient had a small bed sore.

The differential count is remarkable in several respects. Previous to April 3d, the lymphocytes were diminished and the large mononuclear and eosinophile cells markedly increased. Upon this date, when the stained specimens were examined, the large mononuclears numbered four times the normal, and the eosinophiles more than ten times the normal. The patient was restless and noisy; on physical examination the only thing to be discovered was a bed sore the size of a five-cent piece, with a little discharge. Eleven days later when the abrasion had cleaned up and was rapidly healing, another specimen was taken. Instead of a falling-off in the eosinophiles, they were still further increased, amounting to 2671 in a c.mm. Two weeks later, although the lesion had entirely healed, the eosinophiles were still over five times the normal, the large mononuclears also remaining high. Such a great number of eosinophiles is very unusual.

Excluding leukæmia<sup>1</sup> and the results of injections<sup>2</sup> of bacterial products,<sup>3</sup> in both of which the absolute number may be enormous, the highest counts of eosinophiles that we have been able to find in a hurried review of the literature are as follows:

| Author.                | Disease.           | Number of leucocytes. | Per cent. of eosinophiles. | Absolute number of eosinophiles. |
|------------------------|--------------------|-----------------------|----------------------------|----------------------------------|
| Zappert <sup>4</sup>   | Ankylostomiasis,   | 4,300                 | 27.9                       | 1200                             |
| Zappert                | Asthma,            | 7,120                 | 12.36                      | 880                              |
| Zappert                | Pemphigus,         | 16,400                | 29.28                      | 4800                             |
| Zappert                | Lymphosarcoma,     | 11,964                | 17.76                      | 2077                             |
| Roncoroni <sup>5</sup> | Gen. par. excited, | .....                 | 25                         |                                  |

<sup>1</sup> Von Limbeck; Grundriss einer klin. Patologie des Blutes, p. 160.

<sup>2</sup> Rieder: Loc. cit., p. 189.

<sup>3</sup> Zappert: Zeitschrift für klin. Medicin, Bd. xxiii., Heft 3 and 4, p. 298.

<sup>4</sup> Loc. cit., pp. 257, 260, 271, and 280.

<sup>5</sup> Archivio di Psichiatria, Scienze Penale, etc., vol. xv., F. iii. p. 293.

Only in pemphigus and possibly the case of general paralysis during excitement, in which the extent of the leucocytosis was not given, is the absolute number greater than in this patient. To determine what effect, if any, a bedsore might have, two paralytics with open abrasions on the buttocks were examined:

| Case. | Per ct. of lymphocytes. | Per cent. of large mononuclear. | Per cent. of transitional. | Per cent. of neutrophile polymorphonuclear. | Per cent. of eosinophiles. | No. leucocytes counted. |                                                     |
|-------|-------------------------|---------------------------------|----------------------------|---------------------------------------------|----------------------------|-------------------------|-----------------------------------------------------|
| A     | 10.6                    | 8.0                             | 0.8                        | 80.2                                        | 0.4                        | 500                     | Sore open, but clean.<br>Slight purulent discharge. |
| B     | 7.2                     | 6.4                             | 0.6                        | 83.2                                        | 2.2                        | 500                     |                                                     |

The absence of any increase in the eosinophiles in these two cases indicates that probably the bedsore was not the cause of their increase in the patient under discussion. Moreover, the maximum number was present not during the active stage, but after it was nearly healed.

In view of these facts, it is fair to presume that this great augmentation of the eosinophiles has no dependence on the bedsore.

The mental condition of the patient was one of restlessness and irritability, but without the excitement that existed in Roncoroni's case, which had 25 per cent. of eosinophiles.

CASE XV.—J. F., aged forty-three years, admitted April, 1895. For two years before entrance a gradual failure of memory and intellect made evident by numerous business mistakes, hallucinations, and delusions, the latter changing frequently. He is considerably demented, often confused, very forgetful; pupils unequal; tremor of facial muscles; speech good, except for an occasional dropping of a word.

A diminution in the red corpuscles and hæmoglobin is evident with a low degree of leucocytosis. The specific gravity is about normal. The large mononuclear cells are rather high; otherwise there is no noteworthy alteration in the proportion of the various kinds of leucocytes.

CASE XVI.—J. A. H., aged thirty-three years, admitted January, 1895. Successful business man, hard worker. No syphilis. A month prior to admission irritable, extravagant, and reckless. On entrance, tremor of tongue, diminished knee-jerk. Romberg's symptom. Feels well. Exalted ideas of his ability, delusions of wealth. Distinctly demented. Argyll-Robertson pupil. Failed rather rapidly mentally and physically. At times much excited and emotional.

The case is of more value because the blood was obtained within three months of the appearance of the first symptoms of general paralysis. The red corpuscles and hæmoglobin were low, while the specific gravity and white corpuscles are what one would expect in health. The lymphocytes are the only cells that give evidence of any alteration in

the differential count. The highest number of leucocytes was found during a period of excitement.

CASE XVII.—E. D. M., aged thirty-one years, admitted July, 1888. A year before this had a fainting attack with affection of speech. Delusions of persecution. Homicidal and suicidal. Dementia gradually came on. Speaks little. Constant stereotyped motor activity. Pupils unequal, tremor of facial muscles and tongue. Resistive. Speech very much impaired. Several convulsions.

*April 21.* Owing to a fall, has an abscess on elbow. Opened March 20th. Wound healed. Mind lately rather clearer. Much demented.

Standing out in contrast with the preceding case, the disease in this patient was of seven years' duration. A considerable leucocytosis characterizes the earliest examination, in which the large mononuclear element relatively plays the greatest part, though the polymorphonuclear increase is absolutely greater. The second specimen was taken after an abscess had formed near the elbow as a result of trauma. The leucocytosis reached 20,330. The difference between the inflammatory leucocytosis and that which was present before the accident is the preponderance of the polymorphonuclear element in the former. The lymphocytes suffered an actual loss of numbers, while the eosinophiles entirely disappeared. In this instance the character of the differential count was sufficiently changed to make the diagnosis of pus extremely probable. When the incision had entirely healed the count resumed in all essential respects its former proportions.

CASE XVIII.—S. M. H., aged fifty-one years, admitted December, 1894. Heard voices telling him to kill himself and family. Violent and threatening. Frequent fainting spells for a year past. *Tabes dorsalis* for six years. Ptosis of left lid. Argyll-Robertson pupil. Knee-jerks absent on right, slight on left. Sensation diminished all over. Passes urine and feces involuntarily. Constantly grinds his teeth. Mentally dull and apathetic.

The leucocytosis on an average is 35 per cent. above the normal, but does not vary much from the physiological proportion of cellular constituents excepting in an increased number of large mononuclear and a scarcity of eosinophile cells. The highest leucocytosis corresponds to a time of restlessness and excitement.

CASE XIX.—H. M., aged forty-two years, admitted July, 1894. History of syphilis(?) and overwork. For a year had been irritable, and in the past month unusually emotional. Brought to hospital because he suddenly developed the most absurd business schemes on a large scale. Diminished knee-jerks, tremulous tongue, Argyll-Robertson pupils. Incoherent, excited, destructive, and aggressive. Delusions of grandeur. More recently has been quiet and contented, and it was during this period that examinations were made.



| CASE I.   |            | No. fields of white count. | No. sq's of red count. | White. | Red.      | Sp-gr  | Hb.    | Lympho-cytes. |                     | Large mono-nuclear. |                     | Transitional. |                     | Neutrophile polymorpho-nuclear. |                     | Eosinophiles. |                     | No leucocytes count. | Remarks.                     |
|-----------|------------|----------------------------|------------------------|--------|-----------|--------|--------|---------------|---------------------|---------------------|---------------------|---------------|---------------------|---------------------------------|---------------------|---------------|---------------------|----------------------|------------------------------|
| Date.     | Hour.      |                            |                        |        |           |        |        | Pr. ct.       | Abs. No. in 1 c.mm. | Pr. ct.             | Abs. No. in 1 c.mm. | Pr. ct.       | Abs. No. in 1 c.mm. | Pr. ct.                         | Abs. No. in 1 c.mm. | Pr. ct.       | Abs. No. in 1 c.mm. |                      |                              |
| July 16   | 3.00 p. m. | 4                          | 100                    | 13,700 | 4,920,000 | 1062   | 84     | 14.0          | 1918                | 7.5                 | 1028                | 1.0           | 137                 | 76.5                            | 10,480              | 1.0           | 137                 | 300                  | No convulsions for 14 hours. |
| Aug 10    | 3.30 "     | 4                          | 150                    | 14,500 | 5,248,000 | 1060   | 88     | 11.3          | 1638                | 6.5                 | 942                 | 1.5           | 218                 | 79.2                            | 11,484              | 1.5           | 218                 | 1000                 | " " " 17 "                   |
| Sept 10   | 4.00 "     | 4                          | 150                    | 15,000 | 5,200,000 | 1060   | 90     | 10.9          | 1635                | 4.4                 | 660                 | 1.0           | 150                 | 82.1                            | 12,315              | 1.6           | 240                 | 1000                 | " " " 15 days.               |
| Oct 18    | 4.00 "     | 4                          | 150                    | 13,750 | 4,960,000 | 1061   | 85     | 11.7          | 1609                | 4.8                 | 660                 | 1.2           | 165                 | 80.3                            | 11,041              | 2.0           | 275                 | 1000                 | " " " 11 "                   |
| Nov 23    | 3.30 "     | 4                          | 150                    | 12,000 | 5,160,000 | 1058   | 88     | 15.0          | 1800                | 6.6                 | 792                 | 1.9           | 228                 | 73.5                            | 8,820               | 3.0           | 360                 | 1000                 | " " " 31 1/2 "               |
| Apr. 2    | 4.30 "     | 6                          | 150                    | 12,500 | 4,840,000 | 1059   | 84     | 13.6          | 1700                | 9.7                 | 1212                | 1.6           | 200                 | 72.0                            | 9,000               | 3.1           | 388                 | 1000                 | " " " 24 hours.              |
| Average   | 3.45 "     | 4 1/3                      | 141                    | 13,575 | 5,054,700 | 1060   | 86.5   | 12.7          | 1717                | 6.6                 | 882                 | 1.4           | 183                 | 77.3                            | 10,523              | 2.0           | 236                 | 880                  |                              |
| CASE II.  |            | No. fields of white count. | No. sq's of red count. | White. | Red.      | Sp-gr  | Hb.    | Lympho-cytes. |                     | Large mono-nuclear. |                     | Transitional. |                     | Neutrophile polymorpho-nuclear. |                     | Eosinophiles. |                     | No leucocytes count. | Remarks.                     |
| Date.     | Hour.      |                            |                        |        |           |        |        | Pr. ct.       | Abs. No. in 1 c.mm. | Pr. ct.             | Abs. No. in 1 c.mm. | Pr. ct.       | Abs. No. in 1 c.mm. | Pr. ct.                         | Abs. No. in 1 c.mm. | Pr. ct.       | Abs. No. in 1 c.mm. |                      |                              |
| July 19.  | 3.00 p. m. | 3                          | 100                    | 8,000  | 4,492,000 | 1055.5 | 80     | 13.5          | 1080                | 6.0                 | 480                 | 2.0           | 100                 | 75.5                            | 6,040               | 3.0           | 240                 | 400                  | Falling steadily.            |
| Aug 9     | 3.00 "     | 3                          | 100                    | 11,000 | 4,600,000 | 1059   | 82     | 12.3          | 1350                | 4.6                 | 506                 | 0.6           | 66                  | 79.5                            | 8,745               | 3.1           | 341                 | 1000                 | " " " "                      |
| Sept. 15  | 3.00 "     | 4                          | 150                    | 12,750 | 4,760,000 | 1061   | 82     | 13.0          | 1657                | 4.3                 | 548                 | 1.3           | 166                 | 78.6                            | 10,021              | 2.8           | 357                 | 1000                 | " " " "                      |
| Average   | 3.00 "     | 3 1/2                      | 116                    | 10,583 | 4,617,000 | 1058   | 81     | 12.9          | 1363                | 5.0                 | 511                 | 0.7           | 130                 | 77.9                            | 8,268               | 3.0           | 312                 | 1000                 |                              |
| CASE III. |            | No. fields of white count. | No. sq's of red count. | White. | Red.      | Sp-gr  | Hb.    | Lympho-cytes. |                     | Large mono-nuclear. |                     | Transitional. |                     | Neutrophile polymorpho-nuclear. |                     | Eosinophiles. |                     | No leucocytes count. | Remarks.                     |
| Date.     | Hour.      |                            |                        |        |           |        |        | Pr. ct.       | Abs. No. in 1 c.mm. | Pr. ct.             | Abs. No. in 1 c.mm. | Pr. ct.       | Abs. No. in 1 c.mm. | Pr. ct.                         | Abs. No. in 1 c.mm. | Pr. ct.       | Abs. No. in 1 c.mm. |                      |                              |
| July 25   | 4.00 p. m. | 4                          | 100                    | 13,000 | 5,228,000 | 1056   | 90     | 13.8          | 1794                | 6.5                 | 845                 | 1.3           | 169                 | 76.6                            | 9,958               | 1.8           | 234                 | 1000                 | Ataxia, dementia.            |
| Aug 13    | 3.30 "     | 4                          | 125                    | 9,000  | 5,264,000 | 1060   | 86     | 13.5          | 1215                | 7.5                 | 675                 | 1.5           | 135                 | 75.8                            | 6,822               | 1.7           | 156                 | 1000                 | " " " "                      |
| Sept. 14  | 4.00 "     | 4                          | 150                    | 14,500 | 5,160,000 | 1058   | 90     | 13.0          | 1385                | 6.0                 | 870                 | 1.8           | 261                 | 77.8                            | 11,280              | 1.4           | 203                 | 1000                 | Irritable, suspicious.       |
| Oct. 10   | 4.00 "     | 4                          | 150                    | 18,500 | 4,980,000 | 1060   | 85     | 9.5           | 1758                | 3.3                 | 610                 | 1.3           | 240                 | 85.0                            | 15,725              | 0.9           | 166                 | 1000                 | Losing strength. Temp. 99°.  |
| Average   | 3.55 "     | 4                          | 130                    | 13,750 | 5,154,000 | 1058.5 | 87 3/4 | 12.4          | 1663                | 5.8                 | 750                 | 1.5           | 201                 | 78.8                            | 10,946              | 1.5           | 190                 | 1000                 |                              |

## CASE IV.

|          |            |   |     |        |           |                    |                  |      |      |      |      |     |     |      |        |     |     |      |
|----------|------------|---|-----|--------|-----------|--------------------|------------------|------|------|------|------|-----|-----|------|--------|-----|-----|------|
| July 27  | 3.30 P. M. | 4 | 100 | 14,000 | 5,064,000 | 1060               | 83               | 13.3 | 1862 | 5.4  | 756  | 1.4 | 196 | 76.8 | 10,752 | 3.1 | 434 | 1000 |
| Aug. 18  | 4.00 "     | 4 | 150 | 10,000 | 4,812,000 | 1058               | 78               | 16.0 | 1600 | 4.7  | 470  | 1.6 | 160 | 75.2 | 7,520  | 2.5 | 250 | 1000 |
| Sept. 19 | 4.00 "     | 4 | 150 | 12,000 | 4,720,000 | 1059               | 82               | 13.9 | 1668 | 5.0  | 600  | 1.2 | 144 | 77.1 | 9,252  | 2.8 | 336 | 1000 |
| Nov. 13  | 3.00 "     | 4 | 150 | 12,750 | 4,680,000 | 1060               | 84               | 12.3 | 1568 | 5.1  | 650  | 1.4 | 178 | 79.6 | 10,149 | 1.6 | 204 | 1000 |
| Dec. 18  | 3.30 "     | 6 | 150 | 13,000 | 4,800,000 | 1061               | 83               | 13.0 | 1690 | 7.4  | 962  | 0.3 | 39  | 77.1 | 10,023 | 2.2 | 286 | 1000 |
| 1895     |            |   |     |        |           |                    |                  |      |      |      |      |     |     |      |        |     |     |      |
| Feb. 9   | 2.00 "     | 6 | 150 | 12,160 | 3,920,000 | 1060               | 80               |      |      |      |      |     |     |      |        |     |     |      |
| Feb. 9   | 4.00 "     | 6 | 150 | 11,650 | 4,224,000 | 1061               | 83               | 13.8 | 1608 | 8.6  | 1002 | 1.3 | 151 | 74.2 | 8,644  | 2.1 | 245 | 1000 |
| Apr. 25  | 4.00 "     | 6 | 150 | 10,660 | 3,772,000 | 1064               | 86               | 15.4 | 1642 | 11.5 | 1226 | 1.4 | 149 | 70.0 | 7,462  | 1.7 | 181 | 1000 |
| Average  | 3.30 "     | 5 | 145 | 12,027 | 4,499,000 | 1060 $\frac{1}{2}$ | 82 $\frac{1}{2}$ | 13.9 | 1602 | 6.8  | 809  | 1.2 | 145 | 75.7 | 7,686  | 2.3 | 276 | 1000 |

## CASE V.

|          |            |                 |     |        |           |                    |                  |      |      |      |      |     |     |      |        |     |     |      |
|----------|------------|-----------------|-----|--------|-----------|--------------------|------------------|------|------|------|------|-----|-----|------|--------|-----|-----|------|
| July 26  | 4.00 P. M. | 4               | 100 | 11,000 | 4,972,000 | 1058               | 88               | 15.0 | 1650 | 6.5  | 715  | 2.0 | 220 | 75.5 | 8,305  | 1.0 | 110 | 200  |
| Aug. 20  | 4.30 "     | 3               | 110 | 10,000 | 4,660,000 | 1059               | 86               | 15.3 | 1530 | 6.0  | 600  | 1.3 | 130 | 75.8 | 7,580  | 1.6 | 160 | 1000 |
| Sept. 18 | 3.00 "     | 4               | 130 | 18,000 | 4,900,000 | 1060               | 100              | 13.5 | 2430 | 8.0  | 1440 | 1.4 | 232 | 76.2 | 13,716 | 0.9 | 162 | 1500 |
| Sept. 21 | 3.00 "     | 4               | 130 | 10,500 | 4,700,000 | 1058               | 92               | 14.9 | 1565 | 6.8  | 714  | 1.1 | 112 | 76.1 | 7,490  | 1.8 | 116 | 1000 |
| Nov. 16  | 3.30 "     | 4               | 130 | 10,500 | 4,920,000 | 1056               | 85               | 18.0 | 1890 | 9.5  | 996  | 2.7 | 286 | 68.0 | 7,140  | 0.8 | 84  | 1000 |
| Dec. 20  | 3.30 "     | 4               | 130 | 10,000 | 4,634,000 | 1069               | 90               | 18.5 | 1850 | 8.9  | 890  | 0.9 | 90  | 71.0 | 7,100  | 0.7 | 70  | 1000 |
| Mar. 27  | 3.30 "     | 6               | 150 | 12,500 | 4,532,000 | 1060               | 85               | 17.8 | 2225 | 14.2 | 1775 | 2.0 | 250 | 64.8 | 8,100  | 1.2 | 150 | 1000 |
| Average  | 3.45 "     | 4 $\frac{1}{2}$ | 137 | 10,750 | 4,760,000 | 1058 $\frac{1}{2}$ | 87 $\frac{1}{2}$ | 16.6 | 1768 | 8.6  | 865  | 1.6 | 182 | 71.9 | 7,702  | 1.0 | 115 | 957  |

## CASE VI.

|         |            |                 |     |        |           |      |                  |      |      |      |      |     |     |      |        |     |     |      |
|---------|------------|-----------------|-----|--------|-----------|------|------------------|------|------|------|------|-----|-----|------|--------|-----|-----|------|
| July 30 | 3.00 P. M. | 4               | 100 | 15,500 | 4,924,000 | 1060 | 94               | 16.1 | 2465 | 7.3  | 1132 | 1.2 | 186 | 73.6 | 11,408 | 1.8 | 279 | 1000 |
| Sept. 4 | 4.00 "     | 4               | 150 | 13,000 | 4,800,000 | 1060 | 90               | 13.5 | 2015 | 5.7  | 741  | 1.3 | 169 | 75.8 | 9,854  | 1.7 | 221 | 1000 |
| Nov. 9  | 3.00 "     | 4               | 150 | 16,750 | 4,736,000 | 1062 | 87               | 9.6  | 1608 | 9.3  | 1558 | 1.5 | 251 | 76.2 | 12,764 | 3.4 | 569 | 1500 |
| Dec. 11 | 3.15 "     | 4               | 150 | 12,000 | 4,840,000 | 1058 | 78               | 13.5 | 1620 | 11.7 | 1404 | 0.7 | 84  | 71.7 | 8,604  | 2.4 | 288 | 1000 |
| Mar. 19 | 3.30 "     | 6               | 150 | 11,000 | 4,320,000 | 1060 | 75               | 13.0 | 1430 | 10.2 | 1122 | 2.6 | 286 | 71.2 | 7,832  | 3.0 | 330 | 1000 |
| Average | 3.40 "     | 4 $\frac{1}{2}$ | 140 | 13,650 | 4,724,000 | 1060 | 80 $\frac{1}{2}$ | 13.5 | 1833 | 8.8  | 1191 | 1.5 | 191 | 73.7 | 10,092 | 2.5 | 335 | 1100 |

## CASE VII.

|          |            |   |     |        |           |                    |     |      |      |     |     |     |     |      |        |     |     |      |
|----------|------------|---|-----|--------|-----------|--------------------|-----|------|------|-----|-----|-----|-----|------|--------|-----|-----|------|
| July 31  | 3.00 P. M. | 4 | 100 | 13,000 | 4,900,000 | 1060               | 100 | 14.7 | 1937 | 4.2 | 546 | 1.3 | 169 | 77.3 | 10,049 | 2.5 | 325 | 1000 |
| Aug. 23  | 4.00 "     | 4 | 150 | 14,250 | 5,136,000 | 1060               | 98  | 14.0 | 1965 | 3.3 | 470 | 1.0 | 142 | 79.1 | 11,271 | 2.6 | 370 | 1000 |
| Sept. 17 | 4.00 "     | 4 | 150 | 14,000 | 5,080,000 | 1058               | 100 | 13.6 | 1904 | 4.4 | 616 | 0.5 | 70  | 78.1 | 10,364 | 3.4 | 476 | 1000 |
| Average  | 3.40 "     | 4 | 133 | 13,750 | 5,045,000 | 1059 $\frac{1}{2}$ | 99  | 14.1 | 1937 | 4.1 | 544 | 0.9 | 127 | 78.1 | 10,751 | 2.8 | 390 | 1000 |

Contented.  
Restless, deluded.  
Quieter, confused.

<sup>1</sup> This examination is not included in the averages.

Three days after an apoplectic attack.

| CASE VIII. |            |         | No. fields of white count. | No. sq's of red count. | White. | Red.      | Sp.gr. | Hb. | Lymphocytes         |         | Large mono-nuclear. |         | Transitional.       |         | Neutrophile polymorpho-nuclear. |         | Eosinophiles.       |         | No. leucocytes count. | Remarks.                     |                     |
|------------|------------|---------|----------------------------|------------------------|--------|-----------|--------|-----|---------------------|---------|---------------------|---------|---------------------|---------|---------------------------------|---------|---------------------|---------|-----------------------|------------------------------|---------------------|
| Date.      | Hour.      | Pr. ct. |                            |                        |        |           |        |     | Abs. No. in 1 c.mm. | Pr. ct. | Abs. No. in 1 c.mm. | Pr. ct. | Abs. No. in 1 c.mm. | Pr. ct. | Abs. No. in 1 c.mm.             | Pr. ct. | Abs. No. in 1 c.mm. | Pr. ct. |                       |                              | Abs. No. in 1 c.mm. |
| CASE IX.   |            |         |                            |                        |        |           |        |     |                     |         |                     |         |                     |         |                                 |         |                     |         |                       |                              |                     |
| Aug. 10    | 3.00 P. M. |         | 4                          | 125                    | 8,300  | 4,800,000 | 1059   | 75  | 17.1                | 1419    | 6.1                 | 566     | 0.5                 | 41      | 73.9                            | 6,133   | 2.4                 | 199     | 1000                  |                              |                     |
| Sept. 1    | 3.00 "     |         | 4                          | 200                    | 9,750  | 4,600,000 | 1055   | 83  | 19.1                | 1862    | 7.3                 | 711     | 1.3                 | 126     | 70.1                            | 6,834   | 2.2                 | 214     | 1000                  |                              |                     |
| Sept. 20   | 4.00 "     |         | 4                          | 150                    | 8,250  | 4,620,000 | 1060   | 80  | 19.6                | 1617    | 6.4                 | 528     | 1.0                 | 82      | 71.0                            | 5,857   | 2.0                 | 165     | 1000                  |                              |                     |
| Nov. 10    | 3.00 "     |         | 4                          | 150                    | 10,000 | 4,528,000 | 1056   | 85  | 16.7                | 1670    | 6.6                 | 660     | 1.5                 | 150     | 74.7                            | 7,470   | 0.5                 | 50      | 1000                  |                              |                     |
| Average    | 3.15 "     |         | 4                          | 156                    | 9,075  | 4,639,000 | 1057½  | 81  | 18.1                | 1642    | 6.6                 | 616     | 1.1                 | 99      | 72.4                            | 6,593   | 1.8                 | 157     | 1000                  |                              |                     |
| CASE X.    |            |         |                            |                        |        |           |        |     |                     |         |                     |         |                     |         |                                 |         |                     |         |                       |                              |                     |
| Nov. 15    | 3.00 P. M. |         | 4                          | 150                    | 14,250 | 5,000,000 | 1067   | 92  | 12.6                | 1795    | 8.9                 | 1268    | 1.9                 | 271     | 70.5                            | 10,046  | 6.1                 | 870     | 1000                  | Falling.                     |                     |
| Dec. 31    | 3.10 "     |         | 5                          | 150                    | 15,000 | 4,504,000 | 1065   | 82  | 11.5                | 1725    | 10.7                | 1605    | 2.5                 | 375     | 71.6                            | 10,740  | 3.7                 | 555     | 1000                  | "                            |                     |
| Mar. 26    | 3.30 "     |         | 6                          | 150                    | 12,500 | 4,772,000 | 1062   | 78  | 10.2                | 1275    | 12.6                | 1575    | 1.2                 | 150     | 73.0                            | 9,125   | 3.0                 | 375     | 1000                  | Excited.                     |                     |
| Apr. 20    | 5.00 "     |         | 6                          | 150                    | 11,000 | 4,888,000 | 1067   | 85  | 12.0                | 1320    | 11.1                | 1221    | 0.8                 | 88      | 74.0                            | 8,140   | 2.1                 | 231     | 1000                  | Very excited ; breaking down |                     |
| May 4      | 3.30 "     |         | 7                          | 150                    | 20,850 | 4,840,000 | 1064   | 78  | 8.1                 | 1689    | 8.4                 | 1751    | 1.1                 | 229     | 81.6                            | 17,013  | 0.8                 | 167     | 1000                  |                              |                     |
| Average    | 3.40 "     |         | 5¾                         | 150                    | 14,720 | 4,800,800 | 1065   | 83  | 10.9                | 1561    | 10.3                | 1484    | 1.5                 | 223     | 74.1                            | 11,103  | 3.1                 | 440     | 1000                  |                              |                     |
| CASE XI.   |            |         |                            |                        |        |           |        |     |                     |         |                     |         |                     |         |                                 |         |                     |         |                       |                              |                     |
| Aug. 2     | 3.00 P. M. |         | 3                          | 100                    | 11,000 | 4,720,000 | 1059   | 84  | 12.6                | 1386    | 4.5                 | 495     | 1.6                 | 176     | 73.7                            | 8,107   | 7.6                 | 836     | 1000                  |                              |                     |
| Aug. 29    | 4.00 "     |         | 4                          | 150                    | 10,700 | 4,680,000 | 1060   | 81  | 14.0                | 1498    | 5.9                 | 631     | 1.0                 | 107     | 71.0                            | 7,597   | 8.1                 | 867     | 1000                  |                              |                     |
| Sept. 24   | 4.00 "     |         | 4                          | 150                    | 12,000 | 4,900,000 | 1058   | 82  | 14.5                | 1740    | 5.4                 | 648     | 2.1                 | 252     | 71.0                            | 8,520   | 7.0                 | 840     | 1000                  |                              |                     |
| Nov. 8     | 3.00 "     |         | 4                          | 150                    | 13,500 | 4,400,000 | 1058   | 80  | 12.0                | 1620    | 5.0                 | 675     | 1.2                 | 162     | 77.0                            | 10,395  | 4.8                 | 648     | 1000                  |                              |                     |
| Mar. 16    | 3.45 "     |         | 6                          | 150                    | 11,100 | 4,704,000 | 1059   | 72  | 14.2                | 1576    | 3.4                 | 377     | 2.5                 | 278     | 75.2                            | 8,347   | 4.7                 | 522     | 1000                  |                              |                     |
| Average    | 3.55 "     |         | 4½                         | 140                    | 11,660 | 4,680,000 | 1058½  | 79½ | 13.5                | 1566    | 4.8                 | 565     | 1.7                 | 195     | 73.6                            | 8,593   | 6.4                 | 743     | 1000                  |                              |                     |
| CASE XII.  |            |         |                            |                        |        |           |        |     |                     |         |                     |         |                     |         |                                 |         |                     |         |                       |                              |                     |
| Jan. 19    | 4.30 P. M. |         | 6                          | 150                    | 7,600  | 5,008,000 | 1063   | 90  | 16.5                | 1254    | 12.0                | 912     | 0.5                 | 38      | 70.1                            | 5,328   | 0.9                 | 68      | 1000                  |                              |                     |
| Mar. 20    | 4.30 "     |         | 6                          | 150                    | 8,500  | 4,640,000 | 1062   | 82  | 15.6                | 1326    | 11.0                | 935     | 1.3                 | 110     | 70.9                            | 6,027   | 1.2                 | 102     | 1000                  |                              |                     |
| Apr. 19    | 4.45 "     |         | 6                          | 150                    | 9,300  | 5,200,000 | 1059   | 85  | 17.2                | 1600    | 14.9                | 1385    | 1.1                 | 102     | 64.6                            | 6,108   | 2.2                 | 205     | 1000                  |                              |                     |
| Average    | 4.35 "     |         | 6                          | 150                    | 8,467  | 4,949,000 | 1061½  | 85½ | 16.4                | 1393    | 12.6                | 1077    | 1.0                 | 83      | 68.6                            | 5,821   | 1.4                 | 125     | 1000                  |                              |                     |



## CASE XII.

|         |           |   |     |        |           |      |     |      |      |      |      |     |     |      |        |     |     |      |
|---------|-----------|---|-----|--------|-----------|------|-----|------|------|------|------|-----|-----|------|--------|-----|-----|------|
| Nov. 22 | 3.30 P.M. | 4 | 150 | 12,000 | 5,320,000 | 1065 | 93  | 12.5 | 1500 | 6.0  | 720  | 0.7 | 84  | 77.4 | 9,288  | 3.4 | 408 | 1000 |
| Dec. 22 | 3.30 "    | 4 | 150 | 15,750 | 4,864,000 | 1058 | 94  | 10.4 | 1638 | 5.6  | 882  | 2.1 | 331 | 78.9 | 12,427 | 3.0 | 472 | 1000 |
| Mar. 29 | 4.30 "    | 6 | 150 | 13,330 | 4,612,000 | 1063 | 83  | 15.0 | 2000 | 12.4 | 1653 | 0.5 | 66  | 68.5 | 9,131  | 3.6 | 480 | 1000 |
| May 2   | 5.00 "    | 6 | 150 | 15,000 | 5,160,000 | 1062 | 80  | 16.9 | 2535 | 9.4  | 1410 | 1.2 | 180 | 68.0 | 10,200 | 4.5 | 675 | 1000 |
| Average | 4.05 "    | 5 | 150 | 14,020 | 4,980,000 | 1062 | 87½ | 13.7 | 1918 | 8.2  | 1166 | 1.1 | 165 | 73.4 | 10,261 | 3.6 | 509 | 1000 |

## CASE XIII.

|         |           |   |     |        |           |      |    |      |      |     |     |     |     |      |        |     |    |      |
|---------|-----------|---|-----|--------|-----------|------|----|------|------|-----|-----|-----|-----|------|--------|-----|----|------|
| Feb. 13 | 4.30 P.M. | 6 | 150 | 14,330 | 5,400,000 | 1065 | 91 | 12.0 | 1720 | 3.5 | 501 | 0.9 | 129 | 83.5 | 11,965 | 0.1 | 14 | 1000 |
|---------|-----------|---|-----|--------|-----------|------|----|------|------|-----|-----|-----|-----|------|--------|-----|----|------|

## CASE XIV.

|         |           |    |     |        |           |       |    |      |      |      |      |     |     |      |       |      |      |      |
|---------|-----------|----|-----|--------|-----------|-------|----|------|------|------|------|-----|-----|------|-------|------|------|------|
| 1894    |           |    |     |        |           |       |    |      |      |      |      |     |     |      |       |      |      |      |
| Aug. 16 | 4.30 P.M. | 4  | 200 | 9,250  | 5,200,000 | 1060  | 80 | 11.7 | 1082 | 5.8  | 536  | 2.3 | 213 | 72.8 | 6,734 | 7.4  | 685  | 1000 |
| Sept. 6 | 4.30 "    | 4  | 150 | 11,750 | 5,300,000 | 1061  | 80 | 12.2 | 1433 | 7.9  | 928  | 3.3 | 388 | 70.9 | 8,331 | 5.7  | 670  | 1000 |
| Oct. 25 | 4.00 "    | 4  | 150 | 12,500 | 5,020,000 | 1061  | 82 | 9.5  | 1188 | 6.5  | 812  | 2.5 | 312 | 77.4 | 9,675 | 4.1  | 513  | 1000 |
| Nov. 28 | 3.30 "    | 4  | 150 | 12,500 | 5,160,000 | 1060  | 87 | 9.7  | 1213 | 10.0 | 1250 | 2.0 | 250 | 75.0 | 9,375 | 3.3  | 412  | 1000 |
| 1895    |           |    |     |        |           |       |    |      |      |      |      |     |     |      |       |      |      |      |
| Jan. 1  | 4.30 "    | 4  | 150 | 11,250 | 4,720,000 | 1055  | 82 | 8.0  | 900  | 11.2 | 1260 | 3.3 | 371 | 75.1 | 8,499 | 2.4  | 270  | 1000 |
| Apr. 3  | 4.30 "    | 6  | 150 | 14,500 | 4,804,000 | 1062  | 74 | 8.6  | 1247 | 13.9 | 2016 | 3.9 | 565 | 58.9 | 8,541 | 14.7 | 2131 | 1000 |
| Apr. 14 | 4.30 "    | 6  | 150 | 12,660 | 4,852,000 | 1063  | 80 | 10.9 | 1380 | 14.3 | 1810 | 5.0 | 633 | 48.7 | 6,165 | 21.1 | 2671 | 1000 |
| May 1   | 3.30 "    | 6  | 150 | 10,160 | 4,600,000 | 1063  | 83 | 16.5 | 1676 | 13.5 | 1372 | 3.3 | 335 | 55.8 | 5,168 | 10.9 | 1108 | 1000 |
| Average | 4.10 "    | 4½ | 156 | 11,821 | 4,957,000 | 1060½ | 81 | 10.9 | 1265 | 10.4 | 1248 | 3.2 | 383 | 66.8 | 7,811 | 8.7  | 1075 | 1000 |

## CASE XV.

|         |           |   |     |        |           |      |     |      |      |     |     |     |     |      |       |     |     |      |
|---------|-----------|---|-----|--------|-----------|------|-----|------|------|-----|-----|-----|-----|------|-------|-----|-----|------|
| Apr. 18 | 4.30 P.M. | 6 | 150 | 11,830 | 4,720,000 | 1062 | 82  | 17.3 | 2047 | 8.0 | 946 | 1.2 | 142 | 72.1 | 8,529 | 1.4 | 166 | 1000 |
| May 14  | 5.00 "    | 6 | 150 | 10,800 | 4,648,000 | 1060 | 77  | 14.6 | 1577 | 7.3 | 788 | 2.3 | 248 | 74.1 | 8,063 | 1.7 | 184 | 1000 |
| Average | 4.45 "    | 6 | 150 | 11,315 | 4,684,000 | 1061 | 79½ | 15.9 | 1812 | 7.6 | 867 | 1.8 | 195 | 73.1 | 8,266 | 1.6 | 175 | 1000 |

## CASE XVI.

|         |           |    |     |        |           |      |     |      |      |     |     |     |     |      |       |     |     |      |
|---------|-----------|----|-----|--------|-----------|------|-----|------|------|-----|-----|-----|-----|------|-------|-----|-----|------|
| Feb. 14 | 4.30 P.M. | 6  | 150 | 8,500  | 3,600,000 | 1062 | 70  | 16.3 | 1386 | 7.6 | 646 | 0.4 | 34  | 75.0 | 6,375 | 0.7 | 59  | 1000 |
| Mar. 22 | 4.00 "    | 7  | 150 | 11,750 | 4,530,000 | 1061 | 72  | 10.7 | 1238 | 8.0 | 925 | 1.4 | 162 | 79.1 | 9,153 | 0.8 | 92  | 1000 |
| Apr. 27 | 3.15 "    | 6  | 150 | 7,330  | 4,460,000 | 1063 | 78  | 15.5 | 1136 | 8.7 | 638 | 1.1 | 81  | 72.7 | 5,329 | 2.0 | 147 | 1000 |
| Average | 3.50 "    | 6½ | 150 | 9,130  | 4,196,000 | 1062 | 73½ | 14.2 | 1280 | 8.1 | 736 | 1.0 | 92  | 75.6 | 6,952 | 1.1 | 99  | 1000 |

Bed sore; slight discharge,  
" much improved,  
" entirely healed.

| CASE XVII.  |           | No. fields of white count. | No. sqrs of red count. | White. | Red.      | Sp. gr. | Hb. | Lymphocytes. |                     | Large mono-nuclear. |                     | Transitional. |                     | Neutrophile polymorpho-nuclear. |                     | Eosinophiles. |                     | No. leuco-cytes count. | Remarks.                                                                              |
|-------------|-----------|----------------------------|------------------------|--------|-----------|---------|-----|--------------|---------------------|---------------------|---------------------|---------------|---------------------|---------------------------------|---------------------|---------------|---------------------|------------------------|---------------------------------------------------------------------------------------|
| Date.       | Hour.     |                            |                        |        |           |         |     | Pr. ct.      | Abs. No. in 1 c.mm. | Pr. ct.             | Abs. No. in 1 c.mm. | Pr. ct.       | Abs. No. in 1 c.mm. | Pr. ct.                         | Abs. No. in 1 c.mm. | Pr. ct.       | Abs. No. in 1 c.mm. |                        |                                                                                       |
| Apr. 17     | 3.30 p.m. | 6                          | 150                    | 14,830 | 4,680,000 | 1063    | 94  | 12.2         | 1809                | 7.7                 | 1142                | 2.0           | 297                 | 75.3                            | 11,167              | 2.8           | 415                 | 1000                   | Traumatic abscess.<br>1 The examination on April 21st is not included in the average. |
| Apr. 21     | 9.30 a.m. | 6                          | 150                    | 20,330 | 4,875,000 | 1061    | 81  | 5.7          | 1159                | 5.4                 | 1098                | 0.6           | 122                 | 88.3                            | 17,951              | 0             | 0                   | 1000                   |                                                                                       |
| May 20      | 3.15 "    | 6                          | 150                    | 11,500 | 4,640,000 | 1059    | 90  | 16.7         | 1920                | 13.9                | 1598                | 2.3           | 265                 | 63.6                            | 7,314               | 3.5           | 403                 | 1000                   |                                                                                       |
| Average     | 3.20 "    | 6                          | 150                    | 13,165 | 4,660,000 | 1061    | 92  | 14.5         | 1864                | 10.8                | 1370                | 2.1           | 281                 | 69.5                            | 9,240               | 3.1           | 409                 | 1000                   |                                                                                       |
| CASE XVIII. |           |                            |                        |        |           |         |     |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                        |                                                                                       |
| Feb. 16     | 4.00 p.m. | 7                          | 150                    | 11,430 | 5,024,000 | 1060    | 90  | 16.2         | 1852                | 4.7                 | 537                 | 1.2           | 137                 | 77.1                            | 8,813               | 0.8           | 91                  | 1000                   |                                                                                       |
| Mar. 28     | 4.30 "    | 6                          | 150                    | 12,830 | 4,904,000 | 1063    | 82  | 14.8         | 1899                | 8.9                 | 1142                | 0.9           | 115                 | 73.7                            | 9,456               | 1.7           | 218                 | 1000                   |                                                                                       |
| May 1       | 5.00 "    | 6                          | 150                    | 16,500 | 4,496,000 | 1065    | 85  | 10.7         | 1765                | 6.5                 | 1072                | 1.2           | 198                 | 81.3                            | 13,415              | 0.3           | 50                  | 1000                   |                                                                                       |
| Average     | 4.30 "    | 6½                         | 150                    | 13,586 | 4,808,000 | 1062½   | 85½ | 13.9         | 1839                | 6.7                 | 917                 | 1.1           | 150                 | 77.4                            | 10,561              | 0.9           | 120                 | 1000                   |                                                                                       |
| CASE XIX.   |           |                            |                        |        |           |         |     |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                        |                                                                                       |
| Apr. 25     | 4.00 p.m. | 6                          | 150                    | 14,000 | 4,760,000 | .....   | 86  | 17.3         | 2422                | 12.1                | 1694                | 2.0           | 280                 | 67.0                            | 9,380               | 1.6           | 224                 | 1000                   |                                                                                       |
| May 18      | 5.00 "    | 7                          | 150                    | 11,300 | 4,020,000 | 1065    | 92  | 21.5         | 2430                | 13.5                | 1525                | 3.1           | 350                 | 60.3                            | 6,814               | 1.6           | 181                 | 1000                   |                                                                                       |
| Average     | 4.30 "    | 6½                         | 150                    | 12,650 | 4,390,000 | 1065    | 89  | 19.4         | 2426                | 12.8                | 1609                | 2.6           | 305                 | 63.6                            | 8,097               | 1.6           | 152                 | 1000                   |                                                                                       |

TABLE OF AVERAGES.

| Case.           | No. of exami-<br>nations. | Hour.<br>P. M. | No. fields<br>of white<br>counted. | No. agres<br>of red<br>counted. | White. | Red.      | Sp. gr. | Hb.  | Lymphocytes. |                           | Large mono-<br>nuclear. |                           | Transitional. |                           | Neutrophile<br>polymorpho-<br>nuclear. |                           | Eosinophiles. |                           |
|-----------------|---------------------------|----------------|------------------------------------|---------------------------------|--------|-----------|---------|------|--------------|---------------------------|-------------------------|---------------------------|---------------|---------------------------|----------------------------------------|---------------------------|---------------|---------------------------|
|                 |                           |                |                                    |                                 |        |           |         |      | Per ct.      | Abs. No.<br>in<br>1 c.mm. | Per ct.                 | Abs. No.<br>in<br>1 c.mm. | Per ct.       | Abs. No.<br>in<br>1 c.mm. | Per ct.                                | Abs. No.<br>in<br>1 c.mm. | Per ct.       | Abs. No.<br>in<br>1 c.mm. |
| I.              | 6                         | 3.45           | 4½                                 | 141                             | 13,575 | 5,054,700 | 1000    | 86½  | 12.7         | 1707                      | 6.6                     | 882                       | 1.4           | 183                       | 77.3                                   | 10,523                    | 2.0           | 236                       |
| II.             | 3                         | 3.00           | 4                                  | 116                             | 10,583 | 4,617,000 | 1058    | 81   | 12.9         | 1363                      | 5.0                     | 511                       | 0.7           | 130                       | 77.9                                   | 8,268                     | 3.0           | 312                       |
| III.            | 4                         | 3.55           | 4                                  | 130                             | 13,750 | 5,154,000 | 1058½   | 87¾  | 12.4         | 1663                      | 5.8                     | 750                       | 1.5           | 201                       | 78.8                                   | 10,940                    | 1.5           | 190                       |
| IV.             | 8                         | 3.30           | 5                                  | 145                             | 12,027 | 4,498,000 | 1060½   | 82½  | 13.9         | 1662                      | 6.8                     | 809                       | 1.2           | 145                       | 75.7                                   | 7,686                     | 2.3           | 276                       |
| V.              | 6                         | 3.45           | 4                                  | 137                             | 10,750 | 4,761,300 | 1058½   | 87½  | 16.6         | 1768                      | 8.6                     | 875                       | 1.6           | 182                       | 71.9                                   | 7,702                     | 1.0           | 115                       |
| VI.             | 5                         | 3.40           | 4                                  | 140                             | 13,650 | 4,724,000 | 1060    | 80½  | 13.5         | 1833                      | 8.8                     | 1191                      | 1.5           | 195                       | 73.7                                   | 10,092                    | 2.5           | 339                       |
| VII.            | 3                         | 3.40           | 4                                  | 133                             | 13,750 | 5,045,000 | 1059½   | 99   | 14.1         | 1937                      | 4.1                     | 544                       | 0.9           | 127                       | 78.1                                   | 10,751                    | 2.8           | 390                       |
| VIII.           | 4                         | 3.15           | 4                                  | 156                             | 9,075  | 4,638,000 | 1057½   | 81   | 18.1         | 1642                      | 6.6                     | 616                       | 1.1           | 99                        | 72.4                                   | 6,543                     | 1.8           | 157                       |
| IX.             | 5                         | 3.40           | 5½                                 | 150                             | 14,720 | 4,800,800 | 1065    | 83   | 10.9         | 1561                      | 10.3                    | 1484                      | 1.5           | 223                       | 74.1                                   | 11,103                    | 3.1           | 440                       |
| X.              | 5                         | 3.55           | 4½                                 | 140                             | 11,660 | 4,680,000 | 1058½   | 79½  | 13.5         | 1546                      | 4.8                     | 565                       | 1.7           | 195                       | 73.6                                   | 8,543                     | 6.4           | 743                       |
| XI.             | 3                         | 4.35           | 6                                  | 150                             | 8,467  | 4,949,000 | 1061½   | 85½  | 16.4         | 1393                      | 12.6                    | 1077                      | 1.0           | 83                        | 68.6                                   | 5,821                     | 1.4           | 125                       |
| XII.            | 4                         | 4.05           | 5                                  | 150                             | 14,020 | 4,989,000 | 1062    | 87½  | 13.7         | 1918                      | 8.2                     | 1166                      | 1.1           | 165                       | 73.4                                   | 10,261                    | 3.6           | 509                       |
| XIII.           | 1                         | 4.30           | 6                                  | 150                             | 14,330 | 5,400,000 | 1065    | 91   | 12.0         | 1720                      | 3.5                     | 501                       | 0.9           | 129                       | 83.5                                   | 11,965                    | 0.1           | 14                        |
| XIV.            | 8                         | 4.10           | 4½                                 | 156                             | 11,821 | 4,957,000 | 1060½   | 81   | 10.9         | 1245                      | 10.4                    | 1248                      | 3.2           | 383                       | 66.8                                   | 7,811                     | 8.7           | 1075                      |
| XV.             | 2                         | 4.45           | 6                                  | 150                             | 11,315 | 4,684,000 | 1061    | 79½  | 15.9         | 1812                      | 7.6                     | 867                       | 1.8           | 195                       | 73.1                                   | 8,266                     | 1.6           | 175                       |
| XVI.            | 3                         | 3.50           | 6½                                 | 150                             | 9,130  | 4,196,000 | 1062    | 73½  | 14.2         | 1280                      | 8.1                     | 736                       | 1.0           | 92                        | 75.6                                   | 6,952                     | 1.1           | 99                        |
| XVII.           | 2                         | 3.20           | 6                                  | 150                             | 13,165 | 4,660,000 | 1061    | 92   | 14.5         | 1864                      | 10.8                    | 1370                      | 2.1           | 281                       | 69.5                                   | 9,240                     | 3.1           | 409                       |
| XVIII.          | 3                         | 4.30           | 6½                                 | 150                             | 13,586 | 4,808,000 | 1062½   | 85½  | 13.9         | 1839                      | 6.7                     | 917                       | 1.1           | 150                       | 77.4                                   | 10,561                    | 0.9           | 120                       |
| XIX.            | 2                         | 4.30           | 6½                                 | 150                             | 12,650 | 4,390,000 | 1065    | 89   | 19.4         | 2426                      | 12.8                    | 1609                      | 2.6           | 395                       | 63.6                                   | 8,097                     | 1.6           | 152                       |
| Final averages. |                           | 3.55           | 4.9                                | 144                             | 12,202 | 4,789,900 | 1060¾   | 84.9 | 14.2         | 1748                      | 7.8                     | 932                       | 1.5           | 182                       | 73.9                                   | 8,744                     | 2.6           | 414                       |



One sees a loss in the red corpuscles and hæmoglobin with a high specific gravity. The leucocytosis is different from most of the other cases. The number of lymphocytes is even above normal, and the large mononuclear and transitional cells are much more abundant than normally.

CONCLUSIONS. In looking over the final table of averages we see that as a whole the hæmoglobin in general paralysis ranges from 73 to 92 per cent., never falling below 70 per cent. The percentage is usually higher several months after entrance than on admission, which is probably due more to hospital care and abundant good food than to any change in the disease.

The specific gravity varies from 1058 to 1066, a difference that may be found in healthy individuals. The average falls somewhat below the normal, but the tendency is not pronounced enough to make it of any practical importance.

Much more constant is the diminished number of red corpuscles, which in only 4 cases reaches 5,000,000. Nevertheless they maintain a much better average than some observers have stated.

The leucocytosis is never very great, but considering that it is present in some degree in the great majority of a large number of observations, we are led to believe that *in most cases of general paralysis there is a slight leucocytosis, amounting on an average to about 22 per cent. increase over the normal.* Of three cases examined within four months of the beginning of the disease, two had no leucocytosis; a third, of longer duration and rapid in its progress, exhibited a decided increase in the white corpuscles. From these few results it seems that *early cases of general paralysis may have no leucocytosis whatever unless accompanied by excitement or running a rapid course.* Nothing further can be said with regard to a correspondence between the degree of leucocytosis and the stage of the disease, since in many instances the leucocytes are more abundant in the earlier than in the later stages.

In the analysis of the leucocytes, the lymphocytes in every case but one are found to fall below the normal average. The large mononuclear cells, on the other hand, are generally increased, sometimes to three times the usual number. Roughly speaking, the average increase in the large mononuclears offsets the diminution in the lymphocytes, so that the total mononuclear element is little altered from the normal. The transitional forms nearly always vary with the large mononuclears. The polynuclear cells as a rule vary directly with the leucocytosis, as with but few exceptions they are the predominant variety.

The eosinophiles are more changeable than any other form, varying from 14 to 1075 in a c.mm. They are inclined to be more plentiful in the cases that are restless and show motor excitement, although sometimes the reverse is true.

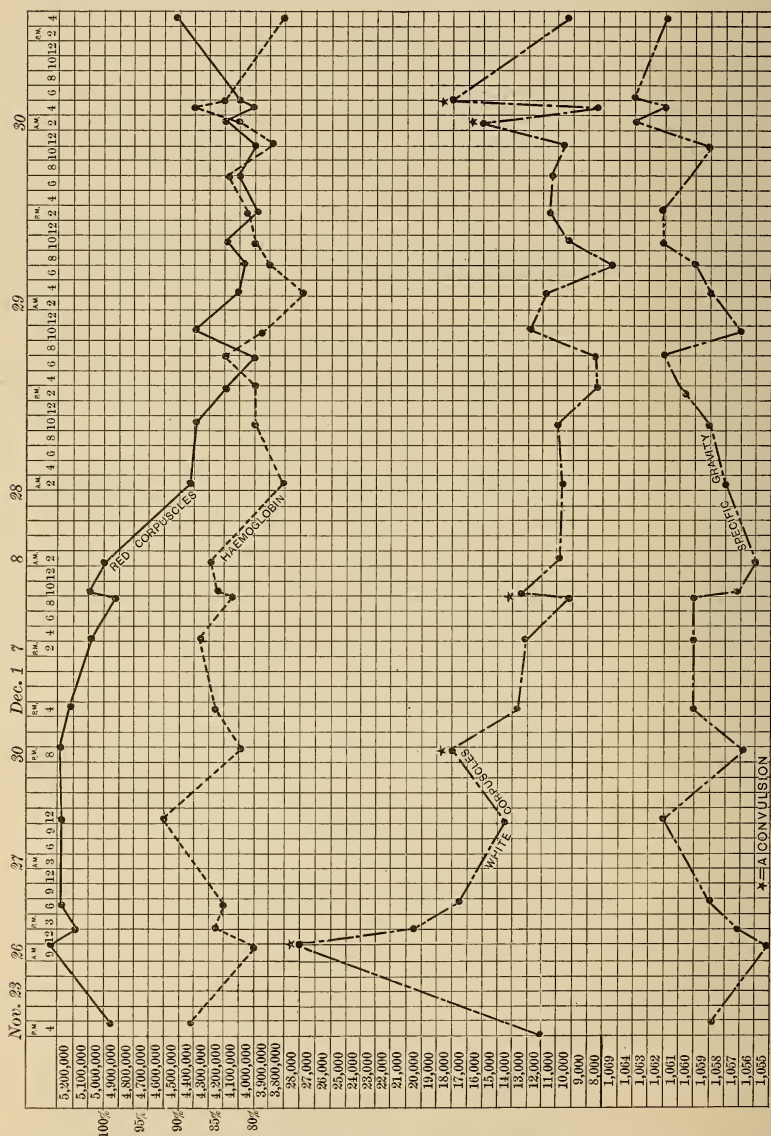
## CASE I—CONVULSIONS.

| Date.    | Hour.         | No. fields of white count. | No. sq's of red count. | White  | Red.      | Sp. gr. | Hb. | Lymphocytes. |                     | Large mono-nuclear. |                     | Transitional. |                     | Neutrophile polymorpho-nuclear. |                     | Eosinophiles. |                     | No. leucocytes count. | Remarks.                       |
|----------|---------------|----------------------------|------------------------|--------|-----------|---------|-----|--------------|---------------------|---------------------|---------------------|---------------|---------------------|---------------------------------|---------------------|---------------|---------------------|-----------------------|--------------------------------|
|          |               |                            |                        |        |           |         |     | Pr. ct.      | Abs. No. in 1 c.mm. | Pr. ct.             | Abs. No. in 1 c.mm. | Pr. ct.       | Abs. No. in 1 c.mm. | Pr. ct.                         | Abs. No. in 1 c.mm. | Pr. ct.       | Abs. No. in 1 c.mm. |                       |                                |
| July 16  | 3.00 P.M.     | 4                          | 100                    | 13,700 | 4,920,000 | 1062    | 84  | 14.0         | 1918                | 7.5                 | 1028                | 1.0           | 137                 | 76.5                            | 10,480              | 1.5           | 137                 | 300                   |                                |
| Aug. 10  | 3.30 "        | 4                          | 150                    | 14,500 | 5,248,000 | 1060    | 88  | 10.3         | 1638                | 6.5                 | 942                 | 1.5           | 218                 | 79.2                            | 11,484              | 2.5           | 218                 | 1000                  |                                |
| Sept. 10 | 4.00 "        | 4                          | 150                    | 15,000 | 5,200,000 | 1060    | 90  | 11.9         | 1635                | 4.4                 | 660                 | 1.0           | 150                 | 82.1                            | 12,315              | 1.6           | 240                 | 1000                  |                                |
| Oct. 18  | 4.00 "        | 4                          | 150                    | 13,750 | 4,960,000 | 1061    | 85  | 11.7         | 1609                | 4.8                 | 660                 | 1.2           | 165                 | 80.3                            | 11,041              | 2.0           | 275                 | 1000                  |                                |
| Nov. 23  | 4.30 "        | 4                          | 150                    | 12,000 | 5,160,000 | 1058    | 88  | 15.0         | 1800                | 6.6                 | 792                 | 1.9           | 228                 | 73.5                            | 8,820               | 3.0           | 361                 | 1000                  |                                |
| "        | 26 9.00 A.M.  | 4                          | 150                    | 28,000 | 5,376,000 | 1055    | 80  | 7.5          | 2100                | 11.0                | 3800                | 3.5           | 980                 | 77.5                            | 21,700              | 0.5           | 140                 | 1000                  | Immed. after very severe conv. |
| "        | 26 12.00 "    | 4                          | 150                    | 20,500 | 5,172,000 | 1057    | 85  | 4.7          | 1046                | 5.1                 | 963                 | 2.0           | 410                 | 88.2                            | 18,810              | 0.0           | 0                   | 1000                  | 2 hours "                      |
| "        | 26 5.00 P.M.  | 4                          | 150                    | 17,500 | 5,216,000 | 1058    | 84  | 4.6          | 805                 | 6.7                 | 991                 | 1.1           | 175                 | 88.7                            | 15,523              | 0.1           | 17                  | 1000                  | " "                            |
| "        | 27 10.00 A.M. | 4                          | 150                    | 14,500 | 5,208,000 | 1062    | 92  | 7.7          | 1117                | 5.6                 | 980                 | 1.1           | 160                 | 83.6                            | 12,122              | 0.9           | 130                 | 1000                  | " "                            |
| "        | 7.45 P.M.     | 4                          | 150                    | 18,000 | 5,304,000 | 1057    | 82  | 11.3         | 2034                | 18.1                | 3258                | 3.9           | 902                 | 63.1                            | 11,358              | 3.6           | 648                 | 1000                  | Immed. after moderate conv.    |
| Dec. 1   | 3.15 "        | 4                          | 150                    | 13,750 | 5,164,000 | 1060    | 85  | 9.5          | 1306                | 11.2                | 1540                | 3.0           | 412                 | 73.9                            | 10,161              | 2.4           | 330                 | 1000                  | " "                            |
| "        | 7 3.15 "      | 4                          | 150                    | 13,000 | 5,088,000 | 1060    | 87  | 11.0         | 1430                | 10.8                | 780                 | 1.1           | 143                 | 79.1                            | 10,283              | 2.8           | 364                 | 1000                  | 5 hours before light conv.     |
| "        | 7 8.00 "      | 4                          | 150                    | 10,500 | 4,908,000 | 1060    | 83  | 13.3         | 1399                | 6.0                 | 1134                | 4.3           | 450                 | 68.2                            | 7,161               | 3.4           | 357                 | 1000                  | 25 min. "                      |
| "        | 7 8.25 "      | 4                          | 150                    | 13,250 | 5,100,000 | 1057    | 85  | 14.1         | 1868                | 13.7                | 1815                | 3.5           | 464                 | 65.5                            | 8,679               | 3.2           | 424                 | 1000                  | Immed. after light conv.       |
| "        | 8 1.15 A.M.   | 4                          | 100                    | 11,750 | 4,988,000 | 1056    | 86  | 10.5         | 1155                | 11.5                | 1265                | 2.3           | 253                 | 73.2                            | 8,092               | 2.5           | 275                 | 1000                  | 4 3/4 hours later.             |
| "        | 16 8.40 P.M.  | 4                          | 150                    | 13,000 | 4,904,000 | 1057    | 83  |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                       |                                |
| "        | 23 11.10 "    | 4                          | 150                    | 17,500 | 4,800,000 | 1058    | 78  |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                       |                                |
| "        | 24 8.45 A.M.  | 4                          | 150                    | 12,500 | 4,684,000 | 1060    | 80  |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                       |                                |
| "        | 27 6.00 P.M.  | 4                          | 100                    | 11,250 | 4,868,000 | 1058    | 80  |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                       |                                |
| "        | 28 1.00 A.M.  | 5                          | 100                    | 10,800 | 4,400,000 | 1059    | 80  |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                       |                                |
| "        | 28 9.00 "     | 5                          | 150                    | 11,000 | 4,300,000 | 1059    | 80  |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                       |                                |
| "        | 28 1.45 P.M.  | 4                          | 150                    | 8,500  | 4,228,000 | 1061    | 80  |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                       |                                |
| "        | 28 5.45 "     | 5                          | 150                    | 8,600  | 4,016,000 | 1062    | 84  |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                       |                                |
| "        | 28 10.45 "    | 6                          | 150                    | 13,000 | 4,440,000 | 1057    | 78  |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                       |                                |
| "        | 29 2.15 A.M.  | 5                          | 150                    | 12,000 | 4,116,000 | 1059    | 74  |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                       |                                |
| "        | 29 6.15 "     | 5                          | 150                    | 7,500  | 4,080,000 | 1060    | 80  |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                       |                                |
| "        | 29 9.15 "     | 5                          | 150                    | 10,800 | 4,200,000 | 1062    | 80  |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                       |                                |
| "        | 29 1.00 P.M.  | 5                          | 150                    | 11,800 | 4,000,000 | 1062    | 81  |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                       |                                |
| "        | 29 6.00 "     | 4                          | 150                    | 11,500 | 4,128,000 | 1060    | 84  |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                       |                                |
| "        | 29 9.45 "     | 5                          | 150                    | 10,800 | 4,000,000 | 1059    | 82  |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                       |                                |
| "        | 30 1.00 A.M.  | 4                          | 150                    | 16,000 | 4,200,000 | 1064    | 77  |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                       |                                |
| "        | 30 2.50 "     | 4                          | 150                    | 8,750  | 4,030,000 | 1062    | 88  |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                       |                                |
| "        | 30 4.00 "     | 4                          | 150                    | 18,000 | 4,100,000 | 1064    | 84  |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                       |                                |
| "        | 30 3.00 P.M.  | 5                          | 150                    | 10,500 | 4,330,000 | 1059    | 77  |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                       |                                |
| "        | 30 4.30 "     | 6                          | 150                    | 12,500 | 4,840,000 | 1062    | 84  |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                       |                                |
| Apr. 2   |               |                            |                        |        |           |         |     |              |                     |                     |                     |               |                     |                                 |                     |               |                     |                       |                                |

10 min. after severe conv.  
2 hours later.  
10 min. after second conv.  
11 hours after convulsion.

CONVULSIONS AND APOPLECTIFORM ATTACKS. Several times during the course of the examinations it was suspected that convulsions and apoplectic attacks might have an influence on the blood. Accordingly,

CHART I.

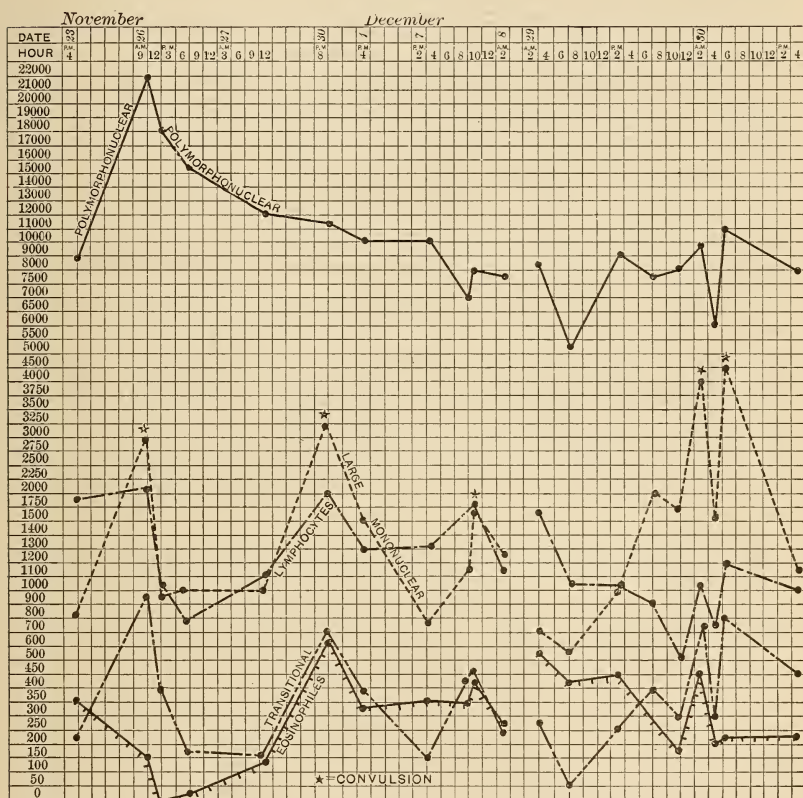


Showing the condition of the blood before and after convulsions of general paralysis in Case I.



with a view of getting light on the subject, Case I. was selected for the purpose, because his convulsive seizures were frequent and came with more regularity than is usual. Not much difficulty was experienced in securing the blood immediately after a seizure, but it was quite different with the specimen preceding an attack, on account of the uncertainty of the onset. Since the ante-convulsive examination is quite as important

CHART II.



Showing the absolute number of the different varieties of leucocytes before and after convulsions in Case I.

as the post-convulsive, an effort was made to learn the condition of the blood just before the spasm as well as after. This was done in the following manner: beginning at a time when an attack was expected, examinations were made continuously at about four hour intervals until it occurred. Thus the blood was secured three hours before Convulsion IV. and one hour before Convulsion V. We were fortunate in getting a specimen only twenty-five minutes previous to Convulsion III.

CASE I. (For history see Case above.)

The temperature was taken after every attack and was never above 99°.

It is evident in studying this series of convulsions that the number of red corpuscles rises uniformly, if not greatly, at the occurrence of a seizure, and that it afterward diminishes as a rule.

The variation in the hæmoglobin is perhaps too small to give it much importance, but in two of three cases it rose slightly and always remained high for some time later.

The lack of agreement at various times in the results on specific gravity does not justify any definite conclusion.

A glance at Chart I. shows a well-marked leucocytosis after Convulsions I. and II., lasting many hours. They do not indicate, however, whether this augmentation takes place gradually or suddenly. Twenty-five minutes before Convulsion III. the leucocyte count was 10,500, being 13,500 afterward. This was a very light attack with but little increase. Preceding Convulsions IV. and V. the counts were low and rose abruptly at the seizure to 16,000 and 18,000, respectively. None of these were preceded by any leucocytosis; although it was present immediately afterward. In general terms the degree of leucocytosis corresponded to the severity and duration of the fit, being highest after the most severe and very slight after a light convulsion. The effect of a series of attacks is apparently to intensify the leucocytosis, as the highest count was the fourth of a succession of convulsions. Moreover, No. V. is greater than No. IV., notwithstanding that they were of similar intensity and duration.

A tendency is noticeable for the leucocytes to fall even below their usual number before an attack. Two hours after No. IV. the white corpuscles were low, while usually the leucocytosis persists for several hours. The explanation may lie in the fact that it preceded by one hour a second seizure, which again produced a leucocytosis.

Twenty-four hours before the above-mentioned convulsion there was a distinct rise in the white as well as the red corpuscles. On this evening, a long deferred attack was expected and indicated by his actions. No muscular spasm, however, was seen at this time. One naturally wonders whether this might not have been an abortion of an attack.

As would be expected, the polymorphonuclear element predominates, not, however, to the extent it does in the inflammatory leucocytoses; in fact, the increase is in the absolute count rather than in the percentage. Just before each attack they diminish and subsequently fall steadily. The rôle of the lymphocytes is peculiar. Previous to a convulsion, even many hours before, they decrease in number to become more numerous again at the time of onset; even then the absolute count rarely reaches and never surpasses the normal. Following the convulsion also they become subnormal again, and slowly recover their usual proportions.

Most remarkable of all is the action of the large mononuclears; unlike the polymorphonuclears their rise begins before and rapidly progresses until the attack, when the maximum is attained. The count preceding a seizure on an average was double the normal, although there was as yet no increase in the leucocytes as a whole; the number of large mononuclears just after the fit was over four times the normal, being in one case nearly 4000 in a c.mm. Subsequently they fell quite rapidly.

An interesting point is the inverse variation between the lymphocytes and large mononuclears. In proportion as the latter increase, the former diminish. The large mononuclears apparently multiply at the expense of the small mononuclears or lymphocytes. It should be added, however, that a great excess of large mononuclear cells remain unaccounted for in this way.

In every respect the transitional forms go hand in hand with the large mononuclears.

No change was observed in the eosinophiles before convulsions, nor immediately afterward, except perhaps a slight increase. Several hours following they had a tendency to become less numerous.

CASE XX.—W. B. R., aged forty-nine years, admitted March, 1892. Had felt nervous and run down for a year before coming to the hospital. Could not grasp simple problems. Gradually lack of judgment came on, delusions of grandeur, hallucinations. Pupils equal, do not respond to light. Knee-jerks absent. Dementia became pronounced. Speech thick and gait ataxic.

*December 28.* Had three convulsions this morning, involving chiefly the right side, with twitching of the eyelids, facial muscles, right arm and leg. Ten minutes after the last the blood was examined and the examination repeated at intervals for two days.

*January 17.* This morning had another apoplectic seizure, the convulsive twitchings lasting for two hours. During all this time there was a clonic spasm of the muscles and partial paralysis.

*18th* Swallows with difficulty. Only partially conscious. Pulse, respiration, and temperature rising.

*19th.* Rapidly failing. Temperature rising.

*20th.* Died at 8.40 A.M.

*Autopsy.* Leptomeningitis, granulations in ependyma, atrophy of the cortex, also a lobular consolidation in one lung, probably due to inhalation.



## CASE XX.—APOPLECTIC ATTACKS.

| Date.   | Hour.          | No. fields of white count. | No. sq's of red count. | White. | Red.      | Sp.gr. | Aëmo-globin. | Lympho-cytes. |                     | Large mono-nuclears. |                     | Transitional. |                     | Neutrophile polymorpho-nuclear. |                     | Eosinophiles. |                     | No. leuco-cytes count. | Remarks.                                         |
|---------|----------------|----------------------------|------------------------|--------|-----------|--------|--------------|---------------|---------------------|----------------------|---------------------|---------------|---------------------|---------------------------------|---------------------|---------------|---------------------|------------------------|--------------------------------------------------|
|         |                |                            |                        |        |           |        |              | Pr.ct.        | Abs. No. in 1 c.mm. | Pr.ct.               | Abs. No. in 1 c.mm. | Pr.ct.        | Abs. No. in 1 c.mm. | Pr.ct.                          | Abs. No. in 1 c.mm. | Pr.ct.        | Abs. No. in 1 c.mm. |                        |                                                  |
| Dec. 28 | 11.45 A. M.    | 4                          | 150                    | 15,500 | 4,248,000 | 1062   | 77           | 7.8           | 1209                | 12.3                 | 1907                | 2.5           | 387                 | 76.9                            | 11,920              | 0.5           | 77                  | 1000                   | Temp. 98.6°, 10 min. after attack.               |
| "       | 28 3.45 P. M.  | 4                          | 150                    | 21,250 | 4,200,000 | 1066   | 93           | 1.7           | 361                 | 4.5                  | 956                 | 1.0           | 213                 | 92.8                            | 19,720              | 0             | 0                   | 1000                   | Temp. 99°, 4 hours after attack.                 |
| "       | 28 8.30 "      | 4                          | 150                    | 20,000 | 4,080,000 | 1064   | 94           | 2.7           | 540                 | 5.0                  | 1000                | 1.2           | 240                 | 91.1                            | 18,220              | 0             | 0                   | 1000                   | Temp. 99°, 8¼ hours after attack.                |
| "       | 29 11.00 A. M. | 5                          | 100                    | 17,200 | 3,816,000 | 1064   | 78           | 2.6           | 448                 | 4.8                  | 825                 | 1.0           | 172                 | 91.6                            | 15,755              | 0             | 0                   | 1000                   | Temp. 102.2° 23½ hrs. after attack.              |
| "       | 30 5.45 P. M.  | 5                          | 150                    | 13,200 | 3,748,000 | 1062   | 77           | 8.6           | 1135                | 7.5                  | 990                 | 2.4           | 316                 | 81.0                            | 10,759              | 0             | 0                   | 1000                   | Temp. 100.5°, 2¼ days after attack.              |
| Jan. 17 | 8.05 A. M.     | 4                          | 150                    | 23,500 | 4,524,000 | 1065   | 93           | 6.7           | 1575                | 21.0                 | 4935                | 4.1           | 963                 | 66.6                            | 15,650              | 1.6           | 377                 | 1000                   | Temp. 99.5°, 10 min. after attack began.         |
| "       | 17 10.30 "     | 5                          | 150                    | 37,000 | 4,480,000 | 1058   | 90           | 2.0           | 740                 | 13.9                 | 5143                | 3.2           | 1184                | 80.8                            | 29,895              | 0.1           | 38                  | 1000                   | Temp. 100.5°, end of attack.                     |
| "       | 17 12.30 "     | 4                          | 150                    | 26,000 | 4,320,000 | 1064   | 88           | 3.2           | 832                 | 9.2                  | 2392                | 1.2           | 312                 | 86.4                            | 22,464              | 0             | 0                   | 1000                   | Temp. 99°, 2 hours after end of attack.          |
| "       | 17 5.50 P. M.  | 5                          | 150                    | 16,500 | 3,612,000 | 1062   | 85           | 2.5           | 412                 | 6.5                  | 1072                | 1.7           | 281                 | 89.3                            | 14,735              | 0             | 0                   | 1000                   | Temp. 98°, 7½ hrs. after end of attack.          |
| "       | 18 8.30 A. M.  | 4                          | 150                    | 12,000 | 4,240,000 | 1061   | 87           | 5.7           | 684                 | 6.6                  | 792                 | 0.2           | 24                  | 87.5¹                           | 10,500              | 0             | 0                   | 1000                   | Temp. 101.4°, 22 hours after end of attack.      |
| "       | 19 1.00 "      | 6                          | 150                    | 8,000  | 3,740,000 | 1057   | 99           | 5.2           | 424                 | 4.7                  | 376                 | 0.4           | 32                  | 89.6²                           | 7,168               | 0             | 0                   | 1000                   | Temp. 103°, 38½ hours after end of attack.       |
| "       | 20 8.00 "      | 7                          | 150                    | 18,250 | 5,632,000 | 1070   | 110          | 7.3           | 1332                | 3.9                  | 712                 | 0.2           | 37                  | 88.3³                           | 16,114              | 0.3           | 55                  | 1000                   | Temp. 101.2°, nearly 2 days after end of attack. |

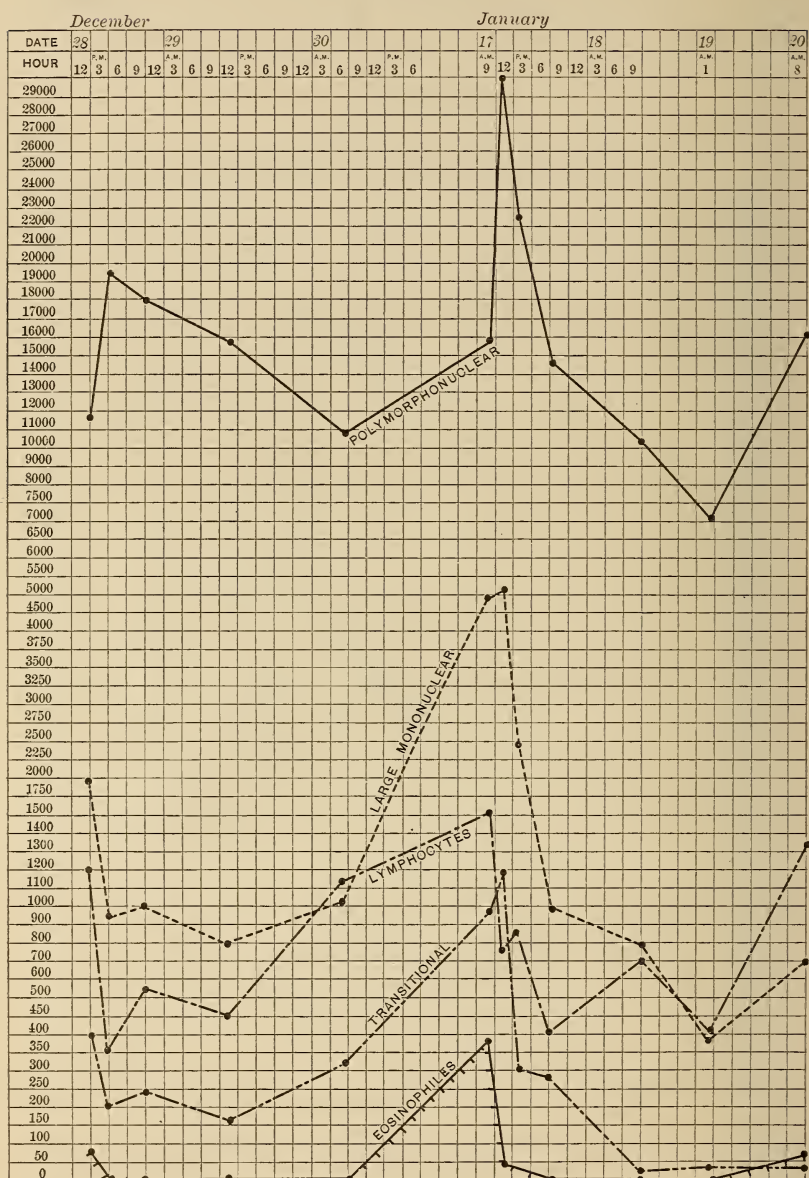
1 Several neutrophile mononuclear cells.

2 12.6 per cent. of neutrophile mononuclear cells.

3 11 per cent. of neutrophile mononuclear cells.



CHART IV.



Showing the absolute number of the different varieties of leucocytes during and after two apoplectic attacks, Case XX.



specimen was obtained at the beginning and at the end, thus throwing some light on changes occurring during the seizure.

Both attacks were followed by a diminution in the red corpuscles that did not soon disappear.

The hæmoglobin sustained only a slight reduction during the long attack, which tended to continue for some time afterward.

The specific gravity fell during the progress of the attack and later rose again.

In contradistinction from this general lowering of blood-values, the white corpuscles were enormously augmented during the attack. In one instance the leucocytosis began to fall immediately after the seizure, and gradually disappeared; whereas in the other the maximum was not reached until four hours after the spasm had ceased. The highest count was obtained at the termination of the more severe attack, when it amounted to 37,000.

The temperature cannot be considered as a factor in leucocytosis. It has been shown by Carter,<sup>1</sup> Winternitz, and others that fever in itself will not produce leucocytosis. Moreover, in this case no correspondence whatever exists between the height of the temperature and the degree of leucocytosis, since the lowest count was present at the time of the highest fever. The influence of the inhalation-pneumonia, which was most likely contracted a short time before death, cannot be held responsible for the leucocytosis, as will be shown in the discussion of the differential count.

At the last examination, thirty minutes before death, it will be observed that the red and white corpuscles, specific gravity, and hæmoglobin all attained an unusual height. The face was cyanosed, breathing difficult and stertorous, and the whole appearance that of a dying man. This increase in white cells has been described by Rieder<sup>2</sup> and Litten<sup>3</sup> under the name of "premortal" or "agonal" leucocytosis. They found it fairly constant and dependent in its intensity upon the duration of the agony.

The polymorphonuclear cells were almost doubled in number during the prolonged attack, while subsequently they either fell gradually or attained a maximum a few hours later and then diminished.

The lymphocytes were subnormal at the beginning of the attack and fell still lower at its termination, notwithstanding the leucocytosis was greater. Their number underwent even further depletion in the hours following, the absolute count being only one-third to one-quarter of the normal. Restoration to the normal took place more slowly in the lymphocytes than in any other element.

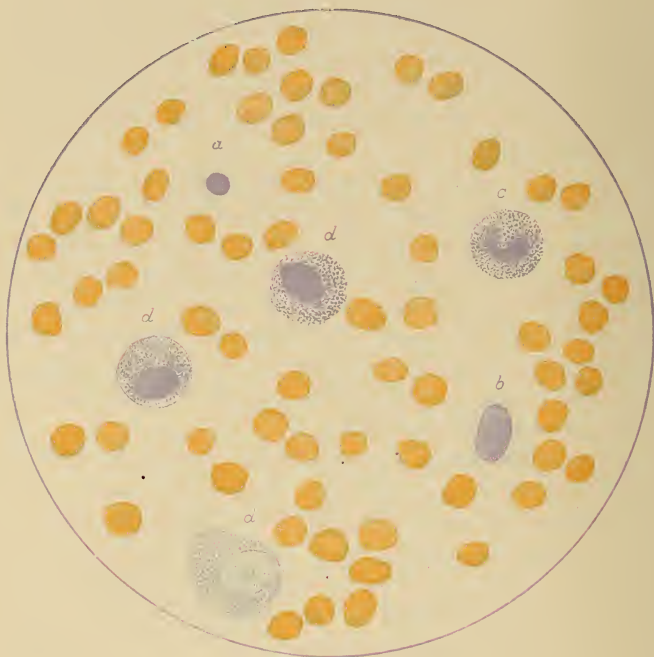
<sup>1</sup> University Medical Magazine, December, 1894, p. 159.

<sup>2</sup> Loc cit. p. 104.

<sup>3</sup> "Zur Pathologie des Blutes." Berlin, klin. Wochens., 1883, p. 27.

The influence of the long attack on the eosinophiles was to reduce their number exceedingly, while in slides taken several hours afterward none at all were present.

When the seizure had just begun there was a decided increase in the large mononuclears, which became even greater at its termination, amounting to over 5000 in a c.mm. in one instance. The return to the normal was comparatively rapid. What has been said of the large mononuclear is true also of the transitional cells.



*a*, Lymphocyte; *b*, large mononuclear; *c*, polymorphonuclear neutrophile;  
*d*, mononuclear neutrophile.

A striking feature of the stained preparations was the variation in the character of the large mononuclear cells at different times. Soon after an attack cells with a small, round, deeply staining nucleus like that of a lymphocyte, but with a large body of clear protoplasm, predominated. Several hours later larger cells with irregular, faintly staining nuclei, that almost filled the cell-body, made up the prevailing type.

More particularly do we wish to call attention to a variety of cell that was present in this patient alone, namely, a cell as large or larger

than the polymorphonuclear neutrophile, with a round or ovoid nucleus, deeply stained, and having a protoplasm thickly sprinkled with neutrophilic granules. These neutrophile mononuclear cells first appeared twenty-two hours after the last prolonged attack and forty-eight hours before death, but only a few were found at this time. At the next examination, thirty-one and one-half hours before death, they constituted 12.6 per cent. of the total number of leucocytes, although those cells having much irregularity or a distinct indentation of the nucleus, were not included in this class. The absolute number in a c.mm. was 1008. Finally, in the last specimen, obtained thirty minutes before death, the total number reached 2000 in a leucocytosis of 18,250.

The origin and nature of these cells are somewhat obscure. They certainly come under the definition of myelocytes, since granulations are as distinct and as abundant in them as in the polymorphonuclear neutrophiles, but it does not follow that they arise from the bone-marrow.

A much simpler explanation presents itself. It is now quite commonly accepted as probable, if not proved, that all the varieties of the leucocytes, excepting, perhaps, the eosinophiles, are but different forms in the growth of the leucocytes. As Ouskow<sup>1</sup> claims, it is likely that the lymphocyte is the youngest cell, and that by the growth of its nucleus and protoplasm it becomes a large mononuclear; this, in turn, by a change in the shape of its nucleus and by a granulation of the protoplasm, passes through the transitional form into the polymorphonuclear neutrophile cell. Physiologically in the evolution of the large mononuclear into the polymorphonuclear neutrophile the nucleus becomes irregular and polymorphous *before* the granulation is well marked. Now in this specimen (see illustration) every stage of this nuclear change can be followed from the perfectly round or ovoid or slightly indented forms to the typical horseshoe nucleus, in all of which the granules are equally distinct and numerous. Why, then, is it not easier to explain these unusual forms by supposing that the granulation, process has preceded the changes in the nucleus instead of appearing subsequently?

These cells might have been due to the apoplectic attack itself or to the influence of the death-agony. If the former were true, we should expect that such cells would have been found in his first attack, which was not the case. We have been able to get a stained specimen in one other case three hours prior to death, but no abnormal leucocytes were present. It should be added, however, that the cyanosis and dyspnoea so pronounced in Case XX. were absent in this patient. The cause for the presence of these cells cannot be assigned.

<sup>1</sup> Loc. cit.



## GENERAL CONCLUSIONS.

GENERAL PARALYSIS. 1. The hæmoglobin and red corpuscles are always diminished.

2. The specific gravity falls slightly below the normal.

3. Most cases show a slight leucocytosis, amounting on an average to about 22 per cent. above the normal. Early cases may have no leucocytosis whatever.

4. In the differential count a decrease is found in the lymphocytes along with a marked increase in the large mononuclear cells. The eosinophiles in a few cases are very numerous.

CONVULSIONS AND APOPLETIFORM ATTACKS. 1. The red corpuscles and hæmoglobin are usually increased at the time of a convulsion. During an apoplectic attack of long duration they are both somewhat diminished.

2. The specific gravity is variable, sometimes increasing, sometimes diminishing, at the time of an attack.

3. There is a leucocytosis after convulsions and apoplectic attacks which is as sudden as it is usually pronounced. It certainly does not appear until within a very short time preceding the convulsion, probably not before it actually takes place.

4. The degree of leucocytosis and the period of its continuance, as a rule, vary directly with the length and severity of the attack.

5. In the production of the leucocytosis the large mononuclear cells are increased relatively more than any other variety.

6. The fact that after convulsions and apoplectic attacks in general paralysis there is not only an increase in the number of white cells, but a change in their character, as shown by the differential count, and at times abnormal cells appear, is an argument against the theory that leucocytosis is merely a change in the distribution of the white corpuscles.

I wish to take this opportunity of thanking Dr. Cowles and Dr. Hoch for their assistance, and especially to acknowledge my indebtedness to Dr. Hibbard for aid in the bibliography.

EPIPHYSEAL SEPARATION OF THE LOWER END OF  
THE FEMUR.

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TRAUMATIC separation of the lower epiphysis of the femur is undoubtedly a rare injury, especially when we note how few of the surgical writers quote from actual cases under their own observation. Hamilton, in his classic work on fractures and dislocations, cites half a dozen cases which he had collected, only one of which he had seen, and that three years after the receipt of the injury. To Packard, Delans, and Tubby is due the credit of having collected and tabulated the majority of the recorded cases. As a great many of the fractures are compound, there is no questioning the accuracy of the diagnosis. (Among surgeons who have seen fractures of this variety, or whose attention has been called to the possibility of the existence of such an injury, there will not be so much difficulty in the recognition of this class of injuries.)

The epiphysis at the lower end of the femur is the first laid down, and consequently is the largest in the body, remaining separate up to maturity, as the injuries under consideration are not acquired until the individual has reached a time of life when considerable muscular activity is brought into play, and again, when the osseous landmarks about the knee are sufficiently developed to exclude possible confusion with the knee, which is liable to happen in very young children. It is possible for the injury to occur during childbirth, as cited by Madam Lachapell, when firm traction was made on the leg during delivery. In her cases I presume that there was no doubt in the diagnosis, as the child was born dead, and that the epiphysis of the upper end of the tibia was also separated. That many simple separations of the epiphysis of the lower end of the femur, with an apparently good prognosis, as well as compound separations of the same character, do badly, and often go on to amputation, is a fact frequently reported, but, so far as I am able to learn from the inconsiderable literature on the subject, is one which has never been satisfactorily explained. If an excuse for this paper is needed, it is that I may bring to your notice what may possibly be a satisfactory solution for the often unfavorable termination of this class of injuries. That solution of continuity should occur at this point rather than elsewhere is explained, first, by the histological formation ; second, by the age at which the injury is found ; and, third, by the mechanism of the violence and the structural anatomy of the part. The ossific centre of the lower epiphysis is not laid down until the be-

ginning of the last month of foetal life, and does not become thoroughly ossified until the twentieth year, so that we can see that the condition would be favorable for accident to happen during delivery if the legs are employed in making traction. It must be remembered that the proliferation of the cartilage of this epiphyseal line is largely responsible for the growth of the length of the limb, and permanent interference with the epiphysis will materially affect the limb's development.

Secondly, when the anatomy of the region is examined it will be noticed that the epiphysis is intimately associated with all the upper portion of the ligamentous apparatus of the knee-joint—an articulation which is the largest and strongest in the body, and whose strength depends almost entirely upon the complicated character of its ligaments, rather than any bony receptacle for the articulating ends of the bones. With this much premised, it can readily be seen the enormous leverage that the leg, with its attached ligaments, must exert upon the epiphysis in over-extension, or adduction, or abduction, as it is in one of these three positions or their modifications in forms of twisting that the separation takes place. Maunder<sup>1</sup> and Hilton<sup>2</sup> each cite cases in which the injury was produced by the individual falling with the leg in a flexed position, the epiphysis being driven back by the pressure of the patella and quadriceps extensor over the trochlear surface of the condyle, the quadriceps and the adductor magnus being the muscles which would be most likely to affect the position of the epiphysis by muscular action.

In careful examination of the periosteum about the lower end of the femur in persons up to maturity it will be noticed that the membrane overlying the epiphyseal cartilage is thicker and denser than that over other portions of the bone, at this point partaking of the character of the ligament, similar to what is noticed at costo-chondral articulations. This ligamentous periosteum is much more liable to be detached from the bone, so that as a result of traumatic separation we will often have a large portion of the lower end of the diaphysis denuded of its periosteal covering as far as the middle third of the femur. This was distinctly noticed in three of my cases, and was largely responsible for the unfavorable termination of Case III., which resulted in amputation. A case is quoted by Hamilton in which the convalescence was very long and finally terminated in the discharge of several pieces of bone, which may have been developed from the osteogenic layer of the denuded periosteum. In one of my cases (Case III.) were found a number of such fragments attached to the separated periosteum.

The separation of the periosteum is liable to be progressive for a short period after the receipt of the primary injury, caused by effusion into the knee-joint, or by subperiosteal hemorrhage, or, later on, by the products

<sup>1</sup> *Lancet*, 1870, p. 192, vide 1.

<sup>2</sup> *Medical Times and Gazette*, February 12, 1859.



of suppuration. If in cases in which the fragments have been successively reduced, failure of union occurs, it is undoubtedly due to lack of nutrition the result of periosteal impairment.

Thirdly, the mechanical forces which tend to produce this class of injuries are rather of a twisting character, as the entanglement of the leg in the wheel of a vehicle or in the belting of machinery. Two of my own cases were caused by the limb becoming entangled in a wheel, and one by belting. Of twenty-seven cases reported by Tubby, thirteen were produced by the same causes (*i. e.*, wheel-entanglement). This in itself should cause us to suspect the nature of the injury when examining boys between the ages of six and eighteen years. We find on examining the list of sixty reported cases that all, with the exception of nine, have occurred in boys. The more restless and adventurous spirit of the boy naturally exposes him to greater dangers.

**SYMPTOMS.** Pain will always be present, but may vary greatly in different persons, depending largely upon the stretching and pressure in the popliteal nerve. Independent of this, the pain that is elicited in the production of crepitus is not so severe as would be found in fractures of the femur higher up.

**MOBILITY.** This may vary considerably, particularly if there is complete solution of the epiphysis, thus permitting the comparatively smooth, bony, and cartilaginous surfaces to slip past each other laterally. If much displacement exist, the fragments may be firmly fixed, and particularly so if rotated by the gastrocnemius. In two of my cases the mobility was very marked.

**DEFORMITY.** This symptom is always to some degree apparent, but is often misleading, as owing to the rapid effusion which takes place in the knee-joint the knee is usually semiflexed, the foot everted, and the patella turned outward.

With reference to the position of the lower fragment, it will often be found bearing its normal relations to the upper surface of the tibia, and the displacement will consist rather of the diaphysis with its sharp margin against the vastus internus muscle, giving the appearance of genu valgum, and, if the joint is flexed, presenting the appearance of the knee-joint being higher than normal. The displacement forward of the epiphysis by the action of the gastrocnemius is in some cases very noticeable, as mentioned by Packard, Hutchinson, Wheelhouse, and others.<sup>1</sup> The displacing element of the large calf-muscle varies in different cases, as it is the exception to find the entire attachment below the epiphyseal line, and if this constantly existed in all cases this class of injuries would be more frequent, as it would place the epiphysis in a position ill-calculated to resist the effects of over-extension of the leg.

<sup>1</sup> Annals of Gynæcology and Pædiatry, November, 1890.

Where such displacement exists the vessels and nerves will be influenced by the lower end of the diaphysis, sometimes being very much stretched, and at others having slipped entirely to one side. This was noticeable in my first case. Two cases are reported in which the vessels were torn—the anterior tibia and the popliteal. Gangrene has several times ensued from the pressure of the diaphyseal fragment against the vessel. Wheelhouse<sup>1</sup> says, “I have seen the popliteal vessels cut across by a sharp sequestrum making its way to the surface.”

Damage to the knee-joint has been observed in a number of cases, but more rarely than might be supposed. It may occur as a secondary complication, as reported by Adams and Liston. This articulation was implicated in my second case, possibly the result of infection, and may be noticed in the photograph of the dried specimen.

DIAGNOSIS. There are two forms of injury with which it is likely to be confounded: *i. e.*, dislocation of the knee-joint and fracture of the femur above the condyle. Traumatic luxations of the knee are a very rare injury in early life, and I do not know of an instance in which it can be proved. In two of my own cases, and in one reported by Holthouse, the idea of dislocation would naturally be suggested by the distortion of the limb. In fact, the displacement was so like what would be expected in lateral luxation that it took some minutes to convince my house-surgeon to the contrary. This was afterward conclusively proved by the specimen, as the limb was amputated in the middle third of the thigh. If the separation is compound, there is little difficulty in making a correct diagnosis; when simple, the abnormal mobility will serve to distinguish it from dislocation, in which the movements of the leg on the thigh are restricted in a marked degree. In simple cases the swelling may occur so rapidly, completely obscuring all the bony landmarks, that it may be days before the exact character of the injury can be recognized, as in an instance reported by Atkinson,<sup>1</sup> in which the patient remained for twenty-five days before the outline of the limb could be defined. Fractures in this part of the bone are rare at any time of life and especially so in persons under maturity, and solution of the continuity of the femur in the region of the condyles in young persons would almost of necessity involve the epiphyseal juncture. (In the cabinet of Professor Ashhurst, at the University of Pennsylvania, is an adult femur showing where the line of separation passed directly through what would correspond to the epiphyseal line.)

In questionable cases the age of the individual and the character of the crepitus will assist in determining the position of the injury. If the crepitus is of the dry, grating character, it can be easily distinguished from the soft, moist crepitus caused by rubbing the diaphysis against

<sup>1</sup> British Medical Journal, March 7, 1885.

<sup>2</sup> British Medical Journal, July 14, 1888.

the cartilaginous head of the tibia. If a considerable portion of bone is broken off with the epiphysis, there will be rough crepitus, which might be misleading to a person unfamiliar with the anatomy of the region. In a case under my care, a lad with ankylosis of the knee-joint and marked flexion, fell, producing a fracture above the condyles. The limb was treated in the extended position, rotating the attached lower fragment. The case terminated fatally, in the second week, from hemorrhage due to pressure on the popliteal vessels. The diagnosis was not verified by a post-mortem. I have always since regarded this as an epiphyseal fracture, its termination being similar to that of a case cited by Wheelhouse. In cases in which a long time has elapsed since the receipt of the injury, difficulty may be experienced in eliminating it from some of the chronic tubercular changes which may affect the knee-joint.

**TREATMENT.** In dealing with these cases of injuries no fixed rule can be laid down; each case must be dealt with on its own merits. There is no question of the gravity of the injury, as nearly half of the sixty cases terminated in amputation. In my own list of cases we were able to save only two limbs; two being compound fractures, demanded immediate amputation, and the other a secondary operation. The point to be determined in the treatment is whether the injury is simple or compound. The condition of the vessels is of great importance; if ruptured or contused, amputation should be performed immediately. The possibility of reduction should be carefully considered, and this is best effected by placing the patient under an anæsthetic. Here no rule can be laid down, except to ascertain first the cause of resistance, which may be simple displacement of the fragment, independent of muscular action. In cases in which the gastrocnemius muscle is attached to the fragment and rotated, as cited by Packard,<sup>1</sup> complete flexion of the leg will assist in relaxing the muscle. Division of the head of the gastrocnemius muscle may be practised through an open wound; if not, the head of the muscle can be divided subcutaneously on either side. Such procedure would facilitate the normal restoration of the joint. In my own cases the deformity was corrected by extension with the leg in the extended position.

Resection of the knee-joint is not to be considered, as traumatic resections are now and always have been regarded as unfavorable operations; and in cases in which it is likely to be considered, amputation will be the safer procedure. Delans has suggested the sawing off of the shaft at the diaphysis as far as the line of denuded periosteum. This procedure is to be deprecated as causing much unnecessary shortening of the bone. If it be necessary, only sufficient to facilitate reduction should be removed.

<sup>1</sup> Loc. cit.



In simple cases, after reduction, the limb may be very satisfactorily treated with a weight extended with the long lateral splint of Liston, in which firm lateral support can be given with junk-bags. With this dressing an ice-bag or evaporating lotion may be applied over the knee. In a case known to me a fixed plaster-of-Paris dressing has been employed after reduction, but had to be removed owing to pressure, as it caused gangrene of two of the toes.

The time required for perfect repair will be, as a rule, several weeks longer than that necessary in fractures in the middle of the shaft of the femur. As soon as the surgeon is convinced that union has taken place, slight passive motion may be gently practised to prevent the breaking up of firmer adhesions later. During the last few weeks of the treatment, when the patient is upon crutches, the limb should be supported by a plaster-of-Paris bandage, or a carefully moulded binder's board splint. In the early treatment of these injuries the toes must be carefully observed, as any impairment of the circulation will be manifested either by great discoloration or commencing gangrene. No intelligent surgeon to-day, in dealing with compound cases, would fail to make the wound as aseptic as possible.

The following is a short report of the five cases which occurred during my service at the Episcopal Hospital :

CASE I.—William B., aged ten years, was admitted to the wards of the Episcopal Hospital, September 30, 1890. While clinging to the back of a vehicle his leg became entangled in the wheel, producing a compound separation of the lower epiphysis of the femur, stripping off a considerable portion of the periosteum. The lower epiphysis was completely separated and carried with it the ossified cartilage. The denuded shaft of the diaphysis projected through the large wound. So great was the violence of the injury that the leg was torn off below the knee. There was no rotation of the epiphysis. The thigh was amputated in the middle third, and the patient made an uninterrupted recovery.

CASE II.—Edward H., aged fourteen years, was admitted to the wards of the Episcopal Hospital, March 23, 1894. While employed as a polisher in a glass-factory he became entangled in belting. On admission it was found that he had sustained a fracture of the left femur, with a compound comminuted fracture of the bones of the right leg and an epiphyseal separation of the lower end of the femur of the same limb. The deformity was very great, so that the knee and condyles could be slipped to either side of the diaphysis, simulating lateral displacement of the knee. As an amputation of the leg at a high point was demanded, it was deemed expedient to amputate through the thigh. On exposing the separation above the lower condyle the diaphysis was clearly separated from the epiphysis and denuded of a large portion of its periosteum, particularly over the popliteal surface. The patient made an uneventful recovery, and left the hospital, with the aid of crutches, cured.

CASE III.—Harry H., aged sixteen years, was admitted to the wards of the Episcopal Hospital, May 4, 1894. While running around a pile of heavy sheet-iron used in ship-building, which was standing upon its edge, a plate fell, striking the side of his leg a little above the knee, producing a marked lateral displacement, which, on admission, was reported to be a lateral dislocation of the knee. On examination (under ether) there was found to be much effusion in and about the knee-joint, with distinct softening and hæmatoma over the lower end of the vastus internus muscle. All deformity could readily be corrected by extension and lateral support, but under lateral pressure, in which the thigh was fixed and the lower or condyloid portion pressed, the deformity would recur, simulating lateral displacement of the knee. On careful examination the sharp outline of the diaphysis of the femur could be distinctly outlined through the softened or ruptured vastus internus muscle. Crepitus of a soft or moist character, such as would be elicited by rubbing two such anatomical surfaces together, could be readily detected.

Extension was applied and long lateral splints with bran-bags on either side of the limb. With this dressing the ends of the bones were kept in perfect apposition, although with much effusion about the knee. In the course of a few days there was evidence of suppuration in the region of the injury, which was opened and drained. Through the incision, which was made in the inner side of the thigh, the line of the separation could be distinctly outlined in perfect apposition. A large portion of the lower end of the femur was divested of its periosteum. Extensive suppuration followed, and in order to prevent a fatal termination the thigh was amputated in the middle third. From that time the patient made an uneventful recovery.

The accompanying photograph was taken from the dried, mounted specimen in my possession.

CASE IV.—Thomas M., aged eighteen years, was admitted to the wards of the Episcopal Hospital, June 8, 1894. While riding in a freight-car and lying on his back, with his legs extended out of the car-door, the leg came in contact with a telegraph-pole, bending it around the edge of the door laterally. On admission there were effusion about the knee and marked softening over the vastus internus muscle. Crepitus and deformity could be elicited by moving the knee and condyles and diaphysis of the femur in opposite directions. When the deformity was reduced there was little or no shortening. Extension, with bran-bags and long lateral splints and an ice-cap over the knee, was used. The effusion gradually subsided, but the softening over the in-



ternal condyle was persistent for nearly a month. The patient was discharged, cured, August 14, 1894, with a fair motion in the knee-joint.

CASE V.—Louis S., aged fifteen years, was admitted to the wards of the Episcopal Hospital, June 14th. While hanging on to the back of a wagon the leg became entangled in a revolving wheel. On admission there was effusion into the knee-joint and marked softening over the internal condyle. Crepitus of a moist character could be detected, although with slight displacement. Extension with weight and firm lateral support, with bran-bags and long lateral splints, were employed. The patient made a good recovery, and left the hospital, cured, in fifty-seven days. The mobility of the joint was unimpaired.

## A CONTRIBUTION TO THE PATHOLOGY AND MORBID ANATOMY OF AMYOTROPHIC LATERAL SCLEROSIS;

WITH A REPORT OF TWO CASES WITH AUTOPSY, IN ONE OF WHICH,  
OBSERVED BY DR. C. L. DANA, A TERMINAL TUBERCULAR  
CERVICAL MYELITIS AND PERFORATING NECROSIS  
OF THE DORSAL CORD WERE FOUND.

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THE clinical picture which is called up by the name amyotrophic lateral sclerosis is a well-defined one, and, as clinical pictures go, is not subject to remarkable variations. So much cannot be said for the pathological process upon which the disease is dependent, nor for the morbid anatomical conditions found at the termination of the disease. The typical clinical manifestations of the disease have been found associated with changes confined to the anterior horns and no involvement of the lateral columns (Senator, *Wiener med. Wochenschrift*, November 31, 1894), and with degeneration of the entire motor tract, the primary and the secondary neuron (Kahler and Pick, *Vierteljahrschr. f. pract. heilk.*, 1879; Kojewnikoff, *Archiv de Neurol.*, vol. vi., 1883; Charcot and Marie, *Archiv de Neurol.*, July, 1883; Lombroso, *Lo Sperimentale*, 1888; Len-nale, *Archiv de Neurol.*, vol. viii., 1887; Mott, *Brain*, "Spring," 1895). Again, cases have been observed in which anatomical investigation has shown degeneration of the motor and sensory systems. Hektoen has recently reported a case of this kind, a typical case of amyotrophic lateral sclerosis, with bulbar paralysis and a posterior sclerosis. Marie found degeneration in the columns of Goll (*Traite de Méd.*, vol. vi. p. 340); Oppenheim found degeneration in Burdach's column (*Archiv f. Psych.*, xxiv. p. 758); Charcot and Marie (*Archiv de Neurol.*, vol. x., 1885) have described degeneration in the columns of Goll; while Maeli found degener-



ation in the column of Burdach (*Archiv f. Psych.*, vol. x., 1880). It is thus seen that the morbid changes are not very constant.

The common pathological findings are destruction of cells in the posterior area of the medulla and the anterior cornu of the cord, and a degeneration of the pyramidal tracts; but with these conditions there is considerable variation, particularly in respect to the condition of the anterior nerves of the spinal cord, their terminations at the periphery, and the condition of the cranial nerves. It is in accordance with our knowledge of secondary degeneration and our conception of the anatomical and physiological unit, the neuron, to believe that when the anterior horn cells are diseased that the anterior roots will suffer in proportion and in intensity. But cases of amyotrophic lateral sclerosis have been described in which the anterior horn cells have been diseased and the anterior root and motor spinal nerves found intact (Kronthal, *Neurolog. Centralb.*, p. 130, 1891), while in the same case the cranial nerves arising from diseased nuclei showed well-marked degeneration.

Other cases of typical amyotrophic sclerosis (clinically) have been found associated with the lesions of poliomyelitis anterioris chronica (Oppenheim, *Archiv f. Psych.*, vol. xxiv. p. 758), with atrophy of the ganglion-cells in the anterior horns, arterial and venous hyperæmia, multiple hemorrhages, and incipient syringomyelia (Wolf, *Zeitschrift f. klin. Med.*, vol. xxv.), not to mention those cases which were shown on autopsy to have been due to internal hydrocephalus and tumor of the cord and cerebellum (R. Schultze, *Archiv f. klin. Med.*, vol. xxiii.), nor those of Kahler and of Schultze in which the symptoms of amyotrophic lateral sclerosis were found associated with gliosis.

The most casual reference to the literature of this subject will show the need for careful study of the morbid anatomy of this disease in order that safe inferences may be drawn as to the most constant pathological pathways that lead up to the diseased tissues of the body. Such study will expose not alone the nature of the disease, but eventually the cause as well.

As well known, therefore, as the disease is clinically, there are still many points in its pathogenesis which are very obscure, while the etiology of the disease is as yet absolutely unknown. The disease is much more uncommon than is generally supposed, if we may come to such a conclusion from the scarcity of well-authenticated cases with the pathological findings which have been published; the writer having been able to find but seventy-two such cases in an extended search through the literature. It behooves us, therefore, when opportunity is given to us for the study of this disease, before and after the death of the patient, to do so with as much care as possible, and particularly by the employment of those means and methods which have done so much in latter years to unfold or reveal the structural secrets of the nervous system.

As to whether the disease is a form of progressive muscular atrophy, as is held by Gowers, Leyden, and some others, or whether the primary lesion is a degeneration of the pyramidal tract and secondary involvement of the gray matter, as was suggested by Charcot and believed by many neurologists, is a question that will be settled when a sufficiently large number of cases which have been verified by histological study shall have been recorded.

It is with the hope of contributing something in this direction to the pathologico-anatomical basis of the disease that the two following cases are added to the literature. In both of them the course of the disease was rather rapid, after a somewhat abrupt onset, the clinical manifestations well pronounced, and some of the pathological changes found in the nervous system of a nature and degree which are uncommon. The first case was under my observation in the Hospital for Nervous Diseases, from shortly after the onset of the disease until death, a period of less than two years, and there was not lacking opportunity, therefore, to observe carefully the evolution and course of the disease. The second case, which I had opportunity of seeing at Prof. Dana's clinic at the Post-Graduate Medical School, was under the continual observation of Dr. Dana, who made a careful histological study of the diseased nervous system and then placed the material at my disposal. It is a pleasure for me to avail myself of the opportunity to express my obligations to Dr. Dana for so doing and for assistance in many other ways, and to Dr. George R. Elliott for assisting with the pathological specimens of the second case.

The clinical history of the first case is as follows :

M. S., aged thirty-three years, born in Russia, by occupation a gold-beater and maker of jewelry, entered the Hospital for Nervous Diseases November, 1894. When he came to the hospital he said that seven weeks before he began to have severe pain in the back of the head and neck, which radiated down to the shoulders, and which was accompanied by a feeling of stiffness in the neck. He became weak progressively, and particularly the right upper extremity began to lose its strength. His wife, who was seen later, makes addition to this statement by saying that he has not been entirely well for some time past, and that the first symptom was loss of dexterity and reliability of grip in the forefinger and thumb of the right hand. Then a year ago, or thereabouts, he began to complain of pain in the back of the head and neck. The gradually increasing weakness in the right hand hindered him from earning his customary wages; and instead of being content with this, or taking a rest, he applied himself without intermission and worked late every night. In fact, overwork is the only element that can be attributed as an etiological factor.

On inquiry into the family history nothing of importance was determined but that his mother had died of consumption. There is no neuropathic taint in the family. He is married and the father of six children, one of which died when eight months old; another, one of twins,

died at birth. He denies all forms of venereal disease, likewise excesses of any kind except smoking. For several years he had smoked cigarettes in great numbers and had inhaled the smoke. He does not remember to have had any severe illness since childhood. The family lived in three small rooms, and the food and hygienic surroundings were about as bad as they could be.

Shortly after the headache and pain in the neck set in he noticed a change in the voice; it became distinctly nasal, and this progressed gradually, so that when first seen there was a most marked twang with the dysarthria; and prolonged efforts at speaking exhausted him, as all the muscles of the face and neck were used to help bring the words out. In addition he had had a great deal of difficulty in swallowing, but this had gradually got better and when he first came under observation he could swallow fairly well. He did not complain of distress in the præcordium nor of cardiac palpitation, nor of any affection of the bowels, bladder, or sexual organs. There was no complaint of difficulty of vision, but for some weeks before coming to the hospital he had suffered a considerable vertigo.

*Examination.* The patient is a tall, sparely built, moderately anæmic and poorly nourished individual. He lies in bed, but can rise to a sitting position, and if given time enough he can get up, slowly and laboriously. The face is masked, expressionless, and staring. When the arms are extended there is considerable coarse tremor of the hands and fingers. The upper extremities are in a semiflexed position. When asked to extend the hands the attempted movements are slow, the little finger becomes extended, the third and fourth remain considerably flexed, and the index very much more so. There is inability to abduct any of the fingers except the little one. There is marked atrophy of the thenar and hypothenar eminences, and when these eminences are squeezed the patient complains of pain. Atrophy of the first interosseous space is pronounced. Passive movement of the arms is resisted, and causes increase of muscular rigidity. When asked to extend the fingers of the left hand it is seen that all the fingers can be extended except the third, although the others are not brought into complete extension.

There is atrophy of the thenar and hypothenar eminences as in the other hand, but the atrophy is not quite so far advanced. The joints of the wrist, elbow, and shoulder feel stiff and immobile. He is able to raise the arms from the side, but the movements are done slowly. Flexion of the elbow is more powerful than extension. There are marked spontaneous and stimulatible fibrillary muscular twitchings of both upper extremities, and this is particularly manifest in the arms. On tapping the belly of any of the arm-muscles the twitching which results is quick and sharp. The tendon-reflexes of the upper extremities are greatly exaggerated, and tapping the trapezii at their junction causes a quick movement of both elbows from the side. A light tap on the chin when the mouth is partly opened causes a striking reflex of the jaw and a shaking of the entire head. There is not much atrophy of the shoulders except that commensurate with the general wasting. There is conspicuous fibrillary twitching, and the mechanical irritability of all the muscles of the upper extremities is increased, particularly in the scapular muscles. The atrophy of the muscles of the extensors of the forearm is very striking. There is but little atrophy of the muscles of the lower extremities, so that they present a marked contrast to the



upper extremities. The lower extremities are spastic, the knee-jerks are enormously exaggerated, and the jerk is accompanied by a slight clonus. Ankle-clonus well marked. Patient complains of tenderness and pain when the lower extremities, especially the calves, are pressed. The gait is spastic in the extreme; when he attempts to walk he gets the heel off the floor, then the foot shoots forward quickly without the toe being raised. He cannot walk unless supported by the arms or from behind.

When he attempts to walk there is clonus when he gets the heel of one foot off the ground and starts to make a step. The right foot is more spastic than the left. When he attempts to stand he takes the position of a wooden man; there is no elasticity or grace about his station.

Examination of the sensibility shows marked hyperæsthesia of the lower extremities over the entire surface. The slightest touch with the point of a pin, he says, is painful. Contact, even the slightest, is felt with the greatest acuity. Extremes of temperature are detected with great rapidity. No loss of the sense of position. Great tenderness over the muscles of the lower extremities, the patient complaining bitterly when the calves or thighs are squeezed gently. There is considerable immobility of the head; when the patient attempts to turn the head the whole body turns too. Nodding movements are less limited, but done slowly. Face mask-like and immobile. For some weeks before he came into the hospital, he says he had difficulty in opening his mouth, and for a time it was barely possible to open it far enough to enable him to take liquid food; at the first examination it could be opened to about its normal extent. The buccal cavity is filled with tenacious mucus which the patient makes no effort to get rid of. The reflexes of the palate and pharynx are present, but not lively. The soft palate is raised on efforts of phonation. Sensibility of the pharynx and larynx seems to be blunted, but it is not lost. Inability to pucker the lips so as to whistle and likewise inability to smoke. It makes his face and jaws very tired to masticate, and he avoids solid food because after trying to chew it his jaw-muscles ache. There is no trouble in swallowing except that the movements of swallowing are performed very slowly. He can bulge out both cheeks and can wink both eyes. Movements of the eyeballs are normal. The pupils contract to light and to accommodation. Hearing, smell, and taste are found to be entirely normal. The tongue can be protruded and comes directly out; it has no appearance of atrophy, but it is a bit unwieldy, and it is liable, he says, to get caught between the teeth. There is no atrophy of the muscles of the face, yet when asked to wrinkle the forehead, show the teeth, etc., all these face-movements are done very slowly. Electrical examination shows response to the faradic current in all the atrophied muscles as well as in those not atrophied. In the thenar and hypothenar eminences there is reaction of degeneration. In the atrophied muscles the electrical irritability is quantitatively diminished both to the direct and the induced currents. The seventh and twelfth nerves and the muscle supplied by them respond to the electric currents. A noteworthy feature brought out in the first and other examinations was that a faradic current so strong as to be painful to the ordinary individual was very agreeable to the patient. The visceral organs seem normal and there are no vasomotor symptoms worthy of mention, except that the pulse remains rapid, about 100. Respirations are normal. Mentally the

patient is cheerful and hopeful. There is no disturbance of the bladder or of the bowels except that these functions, especially the latter, are discharged slowly and the patient has very little bearing-down strength.

The patient grew worse gradually, his symptoms being accentuated seemingly from day to day. Four months after his entrance into the hospital he is almost helpless. He tries to walk aided by two of the other patients, but on account of the spasticity, the weakness and tremor of the legs, he is unable to do so. The atrophy of the hands and of the forearms has progressed, and now it can be seen that the shoulder-muscles are becoming atrophic, the right more than the left. The hands have gradually assumed a contracted, semi-claw shape, and their dexterity is completely lost. The same condition of electrical and sensory irritability exists as when he first entered the hospital. The patient's speech is slow, drawling, non-inflected, and extremely nasal. The face still keeps the same masked appearance, and retains it very largely, even when the patient laughs, except the upper part of the face. Involuntary and uncontrollable waves of smiles and laughter pass over his face at times. He has great difficulty in opening the mouth beyond a very small amount on account of the tension of the muscles of the jaw. The neck is stiff and the head cannot be turned from side to side without turning the entire body. The tendon-jerks all over the body are extremely exaggerated. Pulse 105, irritable and accentuated by slight attempts at exertion. Respirations become labored and rapid on slight exertion. No visceral or sphincteric difficulty. Still has sexual desire and occasional pollutions. The musculature of the lower extremities is fairly well preserved. Mentally he is hopeful, very rarely cast down, and looks forward to recovery.

*March 21, 1894.* The atrophy has progressed so far in the muscles of the shoulder that it is impossible for him to raise the arms from the side to a perpendicular position with the sitting body. The hands are very much deformed as the result of the atrophy, the dexterity and grip of the hands are entirely lost, and the patient is absolutely incapable of helping himself in any way. The neck is still stiff, and as he lies in bed the impression one gets from looking at him or examining him is that he is completely rigid or "wooden." The reflexes, superficial and deep, are enormously exaggerated. There is now no pain in the head or neck. Sensorium entirely free, except that he is mildly hyperæsthetic to all forms of sensory stimulation. Pulse 110; respirations weak and more diaphragmatic than intercostal. Tongue unwieldy, but not at all atrophic, and still responds well to electrical stimulation. He can swallow, but it is a slow and laborious process; but fluids do not regurgitate. Speech the same as at the last examination, with the addition that it is more difficult to understand any of his words, and it is absolutely impossible for him to articulate the labials. No real anaesthesia of the fauces, pharynx, or larynx, but the sensibility of these parts is not very acute. The sphincters remain normal. Vision and hearing normal. Mentally the patient is painfully cheerful and often makes attempts at laughing, in addition to the involuntary waves of laughter, but they are toneless. The lower extremities are now seen to be undergoing an atrophic process in certain places, particularly in the peroneal and internal and femoral groups of muscles. The strength of the lower extremities, which has heretofore been quite well preserved, but which had been rendered useless on account of the severe rigidity, now became seriously impaired.

In the atrophied muscles of the lower extremities there was at no time reaction of degeneration, merely quantitative diminution of faradic irritability. The marked insensitiveness of the patient, previously mentioned, to a faradic current of great intensity was still apparent, and likewise the tenderness on pressure of the muscles.

The patient was not seen for six months from the date of the last examination, when on resuming my service at the hospital he was found to be completely bedridden and evidently in a most advanced stage of the disease. The bulbar symptoms had increased; his attempts at speech were powerless. A question would call forth an endeavor at articulation, but a slight opening of the mouth was followed by an increase of the tension of the muscles of the lower part of the face and neck, and, indeed, of the whole body, as the only result of the effort. The tongue could still be protruded beyond the teeth, and to the sight it did not appear atrophic; to the touch, however, it felt soft and pulpy. Swallowing was a tedious procedure, as fluids would escape through the lips after having been put in the mouth; solids could not be masticated, and even when taken in small bits they went down with painful slowness. There was no regurgitation through the nose. There was no real anæsthesia of the palato-pharyngeal region. The pulse was rapid and feeble; the respirations shallow and powerless, particularly deficient in intercostal action, and the most forced voluntary abdominal contraction was feeble. Efforts at coughing were futile. The only voluntary movements left in the upper extremities was a slight abduction of the arms. The anterior and interior femoral and the peroneal muscles had suffered most of the lower extremities. The reflexes are, as before, greatly exaggerated; a slight tap on the muscles of the back of the neck draws the head back with a quick jerk. The atrophy and deformity of the upper extremities had seemingly become as great as possible, and in the latter part of October the patient seemed suddenly to go to pieces, respirations began to be somewhat impeded, efforts at coughing were extremely exhausting, and soon a distressingly typical picture of failing heart and coexisting pulmonary œdema developed, and the patient quickly succumbed.

The autopsy made a few hours after death by my house-physician, Dr. Deady, revealed the cause of death to have been an apparently recent consolidation of the right lung and extensive pulmonary œdema. I shall confine myself to extracts from the post-mortem records which bear on the nervous system. The skull is not abnormal; the sinuses and vessels are overfilled; the pia is of normal thickness and shows a venous congestion; it is not adherent, and the convolutions and fissures of the hemispheres have a natural appearance. Particular observation was made of the condition of the paracentral region, but there was nothing to suggest any abnormality. The vessels at the base of the brain look and feel degenerated. The hypoglossal nerves look small and thin, and likewise do the anterior roots of the spinal nerves, especially those of the cervical region. Aside from this the cord looks normal to the naked eye, until it is cut across. When a transverse section is made in the mid-cervical region it is seen that the anterior horns are of a dark reddish-brown color and of very much impaired consistency; while they are not absolutely liquid, they are extremely pulpy. An attempt to show this appearance is made by Fig. 1. On further cross-section of the cord preparatory to hardening, it was found that this remarkable



condition of the anterior horns was limited to the cervical region from about the second to the sixth segments. The discoloration did not give the appearance of an acute hemorrhage, but rather reminded one of the appearance of the brain in that condition which is known as red softening.

FIG. 1.



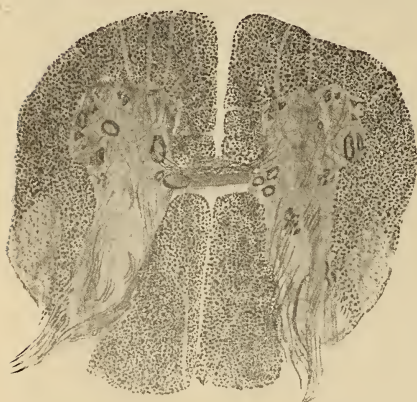
Small pieces taken from several of the atrophied muscles were of a pale-red appearance, flabby to the touch, and with the naked eye were seen to be very heavily striated with whitish-yellow lines and nearly devoid of muscular fibre.

The entire conducting pathway from the cortex to the periphery was prepared for microscopical examination. Small pieces from the paracentral cortex and from the cervical, dorsal, and lumbar levels of the spinal cord were placed at once in 96 per cent. alcohol, and later in absolute alcohol, for thirty-six hours, and then stained according to the methyl-blue method of Nissl. Other pieces from various levels of the cord, medulla, and internal capsule were put in Müller's fluid for eighteen days and then stained after the method of Marchi and Algeri by being put, without previous washing, in a mixture of two parts of Müller's fluid and one part of a 1 per cent. solution of osmic acid, in which they were allowed to remain one week. The remainder of the nervous system was hardened in Müller's fluid and studied later with the aid of many different stains, but particularly by the hæmatoxylin method of Weigert, and its modifications by Pal and Vassale, by Van Gieson's carmine-stain, and by nigrosine.

A description of the microscopical appearances of the cord taken from the different levels, cervical, dorsal, lumbar, and sacral, will be given here, and for the sake of convenience we will begin our description with the sacral region and go upward. Second sacral: The most striking features of the sacral region are, first, the excessive vascularization of the anterior horns; second, the degeneration of the pyramidal tracts, which, of course, at this level are comparatively small and close to the periphery of the cord; and third, the scantiness of cells in the anterior cornua. At this level, as indeed at all other levels of the cord at the junction of the anterior commissure with the base of the anterior horns on either side, are to be seen sections of bloodvessels cut across, their walls thickened and their spaces filled with blood. Throughout the anterior horns numerous circular spaces are to be seen; some of them are filled with blood, while others are entirely empty. With the high

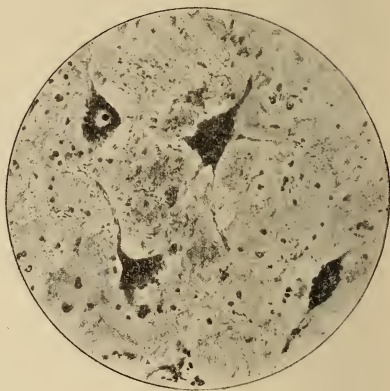
power some of these spaces are seen to be places which were occupied by bloodvessels and from which the vessel has dropped, while others were formerly occupied by small ganglion-cells. Where the vessel still remains the thickness of the walls and their rigid, gaping appearance are striking. The direct pyramidal tracts are nearly, if not quite, entirely degenerated. Throughout a cross-section of this tract are scattered here and there nerve-fibres which are not degenerated, but they are surprisingly few and need a high power for their detection. The antero-lateral descending and ascending bundles seem to be quite normal. The anterior root-bundles look thin. Nissl's stain of sections from this level shows a massive atrophy and disappearance of cells, particularly of the mesial and dorso-lateral groups. Where these groups are to be found normally are seen a few cells, but they look old and decrepit. They are round, granular, and clumped, and their axis-cylinder and protoplasmic processes look like weaklings. The anterior and posterior commissural fibres seem normal. The central canal is entirely filled up with a homogeneous substance which is apparently a proliferation of the ependyma. The central canal is distended so as to cause a considerable bulging of the posterior commissure.

FIG. 2.



Relatively slight degenerative changes.

FIG. 3.



Cells in lumbar region.

Second lumbar region: Complete degeneration of the lateral pyramidal tracts, and with the degeneration there is apparently a small amount of neuroglia-hyperplasia. All the other conducting pathways at this level seem normal. The central canal is filled up and bulging as in the sacral region. The evidences of excessive vascularity and vascular decay are quite as apparent as in the sacral region, but much less than in the dorsal and cervical region. (Fig. 2.) Marchi's stains of this level show the degeneration of the pyramids macroscopically. Microscopically the changes in the pyramids are best seen with this stain on longitudinal section (frontal). There are no changes in the sense of Marchi; *i. e.*, the existence of numerous minute black granules and clumps in the course of fibre-bundles which are still undergoing the process of degeneration. In the specimens a few black granules are seen, but they are scattered around in the most irregular manner, and their presence must be regarded

as accidental or normal. One must conclude, therefore, that the degeneration of the pyramids had gone on to completeness before the death of the patient. Therefore the granula, which indicate a decaying process in the medullary sheaths, are not present. This stain shows likewise a slight thickening of the neuroglia on the periphery of the sections and especially at the periphery of the lateral parts.

Nissl's stain reveals a great scarcity of cells; in many sections only four or five cells can be found in an entire cornua, and these shrunken, with thin processes or without any; some even looking like a clump of color. In some of the cells the nucleus can be made out, and in all the nucleolus. All the atrophied cells stain very dark, and some of them are nearly homogeneously stained. In other sections from the lumbar enlargement a greater number of cells are found in some sections and a less number in others; all of them, however, seem degenerated. A drawing of a section showing the greatest number of cells, which is here given (Fig. 3), shows likewise the serious degenerative changes which the cells have undergone. It is seen that the chromophyllic granules are disintegrated and disseminated throughout the entire cell; the cell-body is deeply pigmented, and the pigment is not equally distributed, but clumped. In others the shape of the cell is altered, and its entire components, cell-body, axis-cylinder, and protoplasmic processes, seem to be in an advanced stage of disorganization.

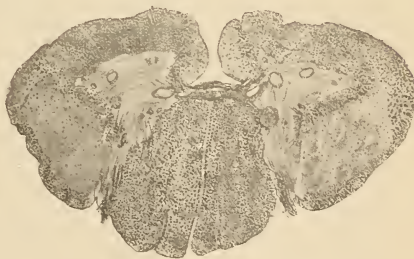
The small cells found normally in the zone between the bases of the anterior and posterior horns do not seem to be quite so abundant as normal. The substantia gelatinosa and posterior roots are normal.

FIG. 4.



To show vascular and degenerative changes.

FIG. 5.



To show vascular and degenerative changes.

Second dorsal segment (Fig. 4): Weigert's stain shows almost total degeneration of the crossed pyramidal tracts. The direct pyramidal tracts are degenerated in a very much less degree. Clarke's column of cells shows clearly, and, as is afterward found with the methyl-blue stain, these cells are normal, save for a shrunken, clumped appearance in a few of the cells. At this level the excessive vascularization is more marked than in the lumbar region and less than in the cervical. Bloodvessels with thickened walls, some cut across, others cut obliquely, are seen in numbers greatly exceeding the normal, while here and there are seen the



spaces from which vessels have dropped, while other spaces indicate the place formerly occupied by ganglionic cells. Specimens stained after Nissl show a surprising poverty of cells, and those to be seen, with the exception of Clarke's column, are situated in the centre of an enlarged pericellular space and give a stunted appearance. The few cells that are to be seen are principally, at this level, in the dorso-lateral, the so-called group of the lateral horn, or antero-internal groups. In fact, most of the cells of the groups of the lateral horns appear normal and are but slightly diminished in number. Marchi sections reveal a condition absolutely analogous to that found in the lumbar region. At the base of the posterior horns normal cells are seen now and then. Such are also observed in the region corresponding to Bechterew's lateral group of the posterior horn (at the lateral border of the gray substance between the posterior and lateral horns).

Seventh cervical (Fig. 5): Hæmatoxylin stain, degeneration of the crossed and direct pyramidal tracts. The degeneration does not seem so complete or quite so extensive as in the dorsal region. That is, with a high power there is to be seen a greater proportion of nerve-fibres with moderately good medullated sheaths. Slight degeneration of the direct pyramidal tracts. The other conducting pathways of the cord seem normal. The condition of the anterior horns at this level, and above, is not an easy one to describe with accuracy.

The bloodvessels of the white and the gray matter, especially of the gray, show enormous alterations. One sees tortuosities, circumscribed and irregular dilatations, aneurismatic bulging out of a circumscribed part of the vessel-wall or cylindriciform dilatation, especially a part where a vessel divides. In most places the walls of the vessels are thickened, but in some places corresponding to the dilatations the walls are thinned. Numerous large and small foci are seen in the gray matter; these are formed by the accumulation of small cells. There is no doubt that these cells are not leucocytes, but red corpuscles, and that consequently we are dealing with small capillary hemorrhages. In one section the source of the hemorrhage can be distinctly traced.

One sees a bloodvessel enter a hemorrhagic focus, where it seems to end, but with a high power it is seen distinctly that the vessel is ruptured at this point. The hemorrhagic foci are numerous: several can be seen in one section and every few sections from a series shows some new ones. Aside from these hemorrhages a particular feature is the large number of spider-cells to be seen, especially near the border of the anterior horns. The spider-cells are more numerous here than in the other regions of the cord.

There would seem to be a decay of this region, a state of necrobiosis and necrocytosis. The condition of excessive vascularization is greater here than in any other region of the cord. In addition to this there would seem to be a rarefaction of the structural foundation of the anterior horns, a brittleness of it, and in many sections, cut with the greatest care from most carefully hardened and imbedded specimens, a fracture and dropping out of the substance. Here and there around the thickened and filled bloodvessels may be seen a corpuscle that is outside the vessel-wall, but a careful search did not find anything which in the widest stretch of the imagination could be called diapedesis.

Methyl-blue stains revealed the cells of this region to be in a bad condition. One is struck first by their scarcity and then by the smallness in

size and lonely appearance of those that are to be seen. Instead of groups of cells, which normally superimposed one above the other go to make up columns, we see here one or two shrunken cells with such stunted process that their ganglionic character can scarcely be recognized, and an irregular granular clumped appearance, situated in the centre of an excessively dilated pericellular space. The cells of Clarke's column alone seem normal.

The central canal is not so completely obliterated as in the dorsal region, but is filled up with a proliferation of the ependyma which causes it to bulge out posteriorly and gives it greatly increased outline and a somewhat crescentic shape.

The fibres going out to form the anterior root-nerves appear extremely small and delicate.

Stains by the Marchi method show the degeneration of the pyramidal tracts and the absence of the characteristic reaction indicates that the process of degeneration had become completed. A part of the right posterior column is lightly stained, but there is much reason to believe that this was the result of incomplete drenching of the specimen, which was a bit large, with the Müller's fluid and osmic acid.

As we ascend in the cervical cord we find nothing but what the description just given will not apply to and cover but the one fact, that as we go brainward there is to be seen a gradually increasing number of normal-appearing medullated fibres in the pyramidal tracts, so that by the time the beginning of the decussation (or the end, rather) is reached more than half the fibres are healthy-looking.

Transverse section of the medulla at a level of the lower extremity of the inferior olive shows that there is scarcely a cell in the hypoglossal nucleus. At this level, laterally and ventrad to the central canal, the large multipolar cells of the twelfth nerve nucleus should begin to show themselves very conspicuously in the normal specimen; but in this case, with the exception of two or three small stunted, black, granular-appearing cells, the space looks transparent and thin. The emerging trunk of the hypoglossal nerve seems, in specimens stained with hæmatoxylin, to be thin, narrow, and delicate. The nucleus of the eleventh nerve seems normal. The nucleus of the tenth nerve is seen, and the cells stained with carmine and examined with the immersion-lens look dark, pigmented, and with increased perinuclear and pericellular spaces. There is unquestionably a degenerative process in these cells. The fasciculus rotundus is present, and, although it is not impossible to say that it is diseased, it looks, in many specimens, a bit suspicious. The pyramids look quite normal. In fact, with the exception of the excessive vascularity of this part of the medulla, the sections seem to be otherwise normal. It is necessary to say, in this connection, that the vascular changes, although quite well marked in the medulla, were not nearly so advanced in degree nor so extensive as were those in the spinal cord, especially in the cervical region.

In the decussation of the pyramids the number of degenerated nerve-fibres to be seen was relatively small, but as soon as the level of the cervical cord was reached going downward when the pyramidal fibres had completely crossed the number of degenerated nerve-fibres to be found in each succeeding section became greater, so that when the fourth cervical segment was reached more than two-thirds of the pyramidal fibres, roughly estimated, would seem to be diseased.

Other important elements in the medulla at this level, including the decussation of the fillet (in which Kronthal found degenerative changes in a case of amyotrophic lateral sclerosis), the nucleus lateralis, and the gray substance of the funiculus gracilis, cuneatus, and substantia gelatinosa, seemed entirely normal.

Sections of the medulla at the middle of the olivary body show that the changes to be seen are confined to the posterior area of Flechsig. The hypoglossal nucleus can scarcely be found. Instead of the large rich nuclei divided into several parts, which should be seen at this level, there is but a cell here and there, and that looking like a vagrant. The emerging root of the twelfth nerve looks small and delicate. The small hypoglossal nucleus of Roller, which lies in the ventral part of the hypoglossal nucleus, seems, however, quite normal. (The contention of Forel that this small group of cells does not give origin to any of the fibres of the twelfth nerve would seem to receive some support from the findings of this case.) The nucleus of the tenth nerve, its two parts on the floor of the ventricle, seems normal; the nucleus ambiguus or vagal accessory nucleus is very indistinct and the cells in carmine look small and atrophic.

In a few sections at this level, which had been stained after the Vassale method, the cells of the olivary bodies looked small, atrophic, and with large pericellular spaces. Sections stained with the Weigert or Pal method did not show similar appearances, and it was concluded, therefore, that this appearance was due to the heat used to hasten the colorization in the Vassale; particularly as the olivary bodies have no connection with the spinal cord and were expected to be normal, as they were.

Transverse section of the uppermost limits of the medulla showed a striking feature, inasmuch as the apex of the hypoglossal nucleus was here to be seen with great distinctness. It is well known that the twelfth nerve nucleus ends at about this level and that it goes to its upward termination like the sharpened end of a wedge. It was this portion of the nucleus that now showed itself so distinctly in contrast to the degenerated, shrunken parts below. In serial sections going from below upward from the junction of the middle and upper parts of the medulla, the number of cells to be found in the hypoglossal nucleus was more apparent. So that it would seem that the part of the nucleus to suffer almost entire ablation was the lower one-half, and that above this the cells were but partly destroyed, but that a very large part.

The small-celled glossopharyngeal nucleus—that is, the upper part of the common accessorio-vago-glossopharyngeal nucleus—was easily to be made out in sections of the medulla at the middle of the restiform bodies. The large-celled glossopharyngeal nucleus is undoubtedly affected, although in nowise to be compared with the impairment of the twelfth nucleus. The cells are shrunken, their processes thin or blunted, and their pericellular spaces are enlarged. At the same time it is necessary to say that a large number of cells are to be seen which are apparently in a good condition.

The eighth nerve, its nuclei and connections, and Deiter's nucleus are in a good state of preservation. A most careful examination was made of the nucleus of the facial nerve, and, although in some specimens of the upper medulla and lower pons the cells did not seem to be quite what they should be, taking it all together not sufficient and constant changes

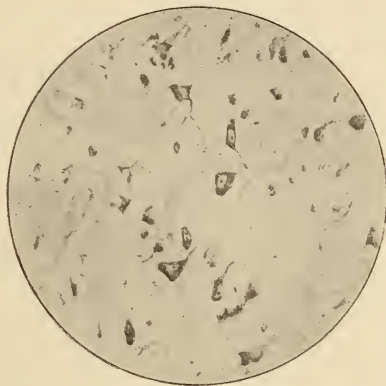


were found in these nuclei to warrant us in saying that the cells were diseased.

The emerging root of the vagus was thin and the ascending root of the fifth entirely normal.

We may curtail our description by saying that from this point on to the cerebral hemispheres nothing showing a departure from the normal could be found. The pons, the mesencephalon, and the region of the internal capsule were most carefully studied in serial section, stained by the hæmatoxylin and carmine dyes, and nothing abnormal was found. Likewise the pieces which had been examined after the method of Marchi did not reveal any degeneration in these parts. In fact, it may be said that above the junction of the pons with the medulla the nervous system was found normal. Pieces of the cortex from the paracentral region studied by the aid of Nissl's stain show that the cells of the cortex appear in the highest degree normal. (Fig. 6.) A careful study of this region was made, not alone with the cortex taken from this patient, but side by side with pieces taken from a patient who had died of disease of the vegetative

FIG. 6.



Cortical cells. High power.

organs and in whom there never had been any cerebral trouble, and the cells of the cortex taken from the patient with amyotrophic lateral sclerosis, compared most favorably with those in the control-specimens. An examination of the pieces of the hypoglossal, ulnar, and popliteal nerves, which were stained with osmic acid, carmine, and hæmatoxylin, showed a degeneration of some of the nerve-fibres and a coexisting overgrowth of interstitial tissue. The degenerative process was more marked in the hypoglossal and ulnar than in the nerves taken from the lower extremities. The specimens stained with osmic acid showed the degeneration most strikingly by causing the degenerated fibres to take on a decidedly black appearance. The increase of interstitial tissue was not to be seen in each place where degenerated nerve-fibres were best made out; on the contrary, in several such places no proliferation of vulgar tissue could be seen at all. So that the impression which was received was that the atrophy of nerve-fibres was by no means a secondary one, using the word secondary here in the sense that the nerve-fibres were encroached upon by overgrowing and ingrowing connective tissue.

The striking feature in this case is, then, the change in the vascularity of the spinal cord and, to a less extent, of the medulla. Throughout the entire extent of the cord they are to be seen, but especially in the cervical and dorsal regions. The walls of the vessels are thickened, their calibre is large, except as encroached upon by proliferation of the tunica, and their lumen is filled with blood. The perivascular spaces are distended, and this particularly in the gray matter. The area of softening, if such it can be called, which was found and which was so conspicuous in the cord in its fresh state in the cervical region in the domain of the anterior horns, was due in part to the overdistended bloodvessels, and in part to the acute necrotic changes, necrobiotic, terminal phenomena which had antedated death for a short time, in all probability. There was no shrinkage of the size of the anterior horns and no marked variation from normal in their contour. The morbid anatomical conditions of the cord aside from this were those commonly found with this disease, viz., a degeneration of the crossed and direct pyramidal tracts and degeneration and atrophy of the ganglionic cells of the anterior horns with a degeneration of the anterior root-nerves and their continuation to the periphery.

The changes in the ganglionic cells of the anterior horns, the cytogenic changes, as determined by the Nissl stain, were of such a character as to leave no doubt of the intensity of the degeneration in those cells which had not been absolutely destroyed. The dissemination of the chromophyllic granules throughout the ganglionic cells has been shown to be entirely apart from changes incident to rest and fatigue. The absence of the small rods which are stained blue in the healthy cell with narrow unstained areas between them, and the uncertain differentiation between the nucleus and the nucleolus, all bespeak the intensity of the degenerative process in the ganglionic cells of the cord.

Clinical summary of Case I.: Male, aged thirty-three years; Russian; occupation gold-beater. Onset of symptoms nearly two years before death. First symptoms pain and stiffness back of head and neck; nasal, slow speech; weakness and loss of dexterity of fingers of the right hand; stiffness and immobility of muscles of face; later weakness of left hand; development of stiffness and weakness in the lower extremities and spastic gait. Normal condition of the sphincters and preservation of all the sensory functions, with hyperacuity of the sense of touch and diminution of acuity to the faradic current. Increasing rigidity of the upper extremities, with atrophy of the hand-muscles and later those of the forearm. Myotatic irritability enormously exaggerated; chin-reflex, occipital phenomenon, ankle-clonus, triceps-reflex, etc. Paresis, atrophy, and spasticity more marked on right side than on left. Quantitative loss of electrical irritability in atrophied muscles. In small muscles of hand reaction of degeneration. Masked appearance of face; waves of uncontrollable smiling and laughter. No apparent atrophy of face or tongue. Characteristic bulbar speech, unwieldiness of tongue, dysphagia, and slowness of swallowing. Tachycardia. Mentally bright and hopeful. Course of disease continually progressive; increasing stiffness and atrophy, especially of hands, forearms, and shoulders; increasing rigidity of head, neck, and, to a less extent, the face; spasticity of lower extremities enormous, becomes almost completely rigid. Bulbar symptoms increased in severity, tongue feels soft and flabby, mouth filled with tenacious mucus, swallowing becomes more difficult. Elec-

trical irritability has become gradually diminished, but complete reaction of degeneration only found in muscles of hands. Anarthria, aphonia; great tachycardia; physical restlessness; mentally uneasy; anxious; respirations shallow; rapid, ineffectual filling up of lungs; death, November, 1894.

Summary of morbid changes: In cervical portion of cord in fresh state, from third to sixth segments reddish, softened appearance in the area of anterior horns. Almost complete degeneration of crossed pyramidal tracts, from the medulla to the end of the cord. Degeneration in the uncrossed pyramidal tracts, but not so extensive or complete. Evidence of degenerated bloodvessels and excessive vascularization throughout the cord, especially in the cervical and dorsal regions and most evident in the gray matter. Massive atrophy of the ganglionic cells of the anterior horns throughout the cord, remarkably so in the cervical region, where they are almost entirely absent, and the few that are to be seen in a section are in a high state of degeneration. Increase of the spider-cells, particularly in the cervical region. Best preservation of cells of any individual column are the cells of the groups of the lateral horns. Central canal filled up and distended with a proliferation of the ependyma. Capillary hemorrhages in the cervical gray matter, associated with rarefaction of the ground-substance of the anterior horns, and a condition of necrobiosis. Striking degeneration of the twelfth nerve nucleus throughout its entire extent, except at its very termination ventrad. Slight degeneration in the common accessorio-vago-glossopharyngeal nucleus. Very slight degeneration in the nucleus of the tenth nerve. Nucleus of the seventh nerve apparently normal. No changes in the motorial pathway above the pons, and cortical cells of the motorial areas entirely normal. Atrophy of the trunks of the twelfth, the ulnar, etc., and degeneration to be seen microscopically. Usual changes in the muscle-fibres.

This case would seem to give testimony in favor of the view enunciated by Charcot, and in opposition to the views of Leyden, Gowers, Senator, and others, inasmuch as the Marchi method of examination showed that the degeneration in the crossed and uncrossed pyramidal tracts had reached its completion. Of course, it is impossible to say how long this antedated death. It is likewise probable from the clinical history that the spastic symptoms had preceded the trophic for some considerable time, the loss of dexterity and agility of the fingers, the stiffness of the neck and face muscles, and the dysarthria, being the first symptoms aside from the headache and vertigo. The symptoms of spasticity were likewise the first to reach their height, and that a considerable time before any evidences of muscle-atrophy were detected. As these symptoms were dependent upon the degeneration of the pyramidal columns, we can, at least, say with certainty that these were the first to be diseased and the first to reach destruction. That is, it is probable that the degeneration of the gray matter was secondary, or deuteropathic. It is such a view that Charcot took of these cases when they were first recognized, and which Erb has helped to establish. It has been difficult to furnish absolute proof of the truth of such a contention, but a case



which has recently been most carefully described by Strumpell will go a long way toward establishing it, by showing, first, that there is a primary systematic degeneration of the pyramidal tracts which causes a symptom-complex exactly similar to that of amyotrophic lateral sclerosis minus the atrophy alone (Strumpell: "Ueber einen Fall von primärer systematischer Degeneration," *Deutsche Zeitschr. f. Nervenheilk.*); and, secondly, that there were found on histological investigation certain conditions which would seem to indicate that the gray matter was becoming affected when the patient died. Strumpell regards his case as belonging to the type of amyotrophic lateral sclerosis, in which the degeneration is confined almost entirely to the pyramidal tracts, while the motor nuclei in the pons, the medulla, and in the anterior horns, as well as their peripheral prolongations, are in part not involved at all, while in part they are involved to a slight degree. The grounds for such a belief are substantiated, he thinks, by the fact that the disease occurred in an elderly man, who had previously been entirely well and in whom there was no inherited or acquired defect; and by the fact that the disease ran a rapid course, and that the first appearance of the disease was referable to the hypoglossal nucleus and the motor nuclei of the cervical cord, that is, in the very nuclei which first showed the manifestations of amyotrophic lateral sclerosis.

CASE II.—D. O'C., aged forty-eight years; England; pianomaker; married; was seen at Prof. Dana's clinic at the Post-Graduate Hospital in January, 1894. He was referred there by Dr. William H. Leszynsky, who furnished many clinical facts regarding the patient. The family history is negative; no nervous disease nor anything resembling the present illness being found in the ascendants. When a child he had scarlet fever, but no other disease. Eight years ago he had iritis in the left eye, and for several years had recurrences in the right eye. Has had gonorrhœa, but denies syphilis. No history of alcoholism. He is unable to give any history of lead-poisoning or of any severe muscular exertion. He states that the eye affected has always been weak. He has had flat-foot and some pains in the foot in consequence of it. Six years ago he injured the right foot so that walking has always been somewhat troublesome. In October, 1893, the patient first noticed a temporary difficulty and indistinctness of speech, and a little later he noticed a weakness in the left arm. This latter had gradually become worse. The speech-defect, which had entirely disappeared, came on temporarily a second time, and he did not recover so quickly from it, and after a few more recurrences the speech-trouble became permanent. This he dates at about December, 1893. About this time also he noticed that his legs were growing weaker, so that walking was more difficult. He observed a gradual atrophy along with the weakness in the left arm, dating as far back as November, 1893. The history, therefore, so far as could be obtained, shows that the first trouble noticed was that of articulation, but that the first permanent trouble was the weakness and atrophy in the left arm; the speech-trouble next became permanent, and then the leg-trouble. All three disturbances were present when seen in January,

1894. At that time, however, the speech-trouble was very slight, and the arm-trouble was by far the most prominent defect.

Examination at this time showed a normal mental condition and healthy thoracic and abdominal viscera. The general nutrition of the man was also good, and he was himself a large and rather strongly built individual. There was a partial paralysis of the muscles of the left arm, forearm, and shoulder. The hand-muscles were most affected, the arm- and shoulder-muscles next. He was unable to flex or extend the fingers, except very feebly. Adduction and abduction were also extremely weak. He could pronate, but could supinate only feebly. Flexion and extension of the forearm could be done with great difficulty, and the arm could be raised only a little way from the side. The shoulder-, arm-, forearm-, and hand-muscles all showed a decided atrophy, which, however, did not affect single physiological groups in the way usually seen in the Duchenne-Aran type of progressive muscular atrophy. There were no contractures. The muscular reactions were taken by Dr. Dana with much care about the latter part of January. They showed in the left deltoids sluggish reaction to the galvanic current, with equal or greater irritability to the positive pole. The galvanic irritability was, if anything, diminished. In the left biceps the cathode-contraction is greater than the anode, and the irritability diminished. In the forearm the flexor muscles showed on the left side a diminution of galvanic irritability with, at the same time, a cathode-closure tetanus. The extensors of the forearm showed cathode and anode tetanus and a slight diminution in galvanic irritability. There were no fibrillary contractions. The tendon-reflexes were greatly exaggerated. There were no sensory disturbances whatever. The patient suffered from no pains and had no anæsthesia either to touch or pain or temperature, nor was there any ataxia. There is some rigidity of the left shoulder, caused by contraction of the pectoralis major, and slight rigidity at the elbow, caused by contraction of the biceps. Both the legs were weak, the left being a little more so than the right; and some atrophic change was present, though not marked and not affecting any special groups. The patient could not get up from a chair without assistance, and in sitting down he dropped suddenly into his seat. When standing he assumed a stooping posture. (Fig. 7.) He was able to walk a short distance with some difficulty. The knee-jerks were greatly exaggerated and ankle-clonus was easily produced. There was also an increase in the plantar reflexes. There were no sensory disturbances in the legs or body. The patient had no trouble with the bladder, and had had none at any time, nor was there any disturbance with the rectum. His appetite was fairly good. He had no difficulty in swallowing at any time. His bowels were regular. The eyes were normal as regards the reflex of the pupils and the optic nerves and the movements of the eyeballs. There was no disturbance of the special senses of smell, taste, and hearing.

The patient was admitted to Dr. Dana's service in Bellevue Hospital, and was given iodide of potassium and electricity and at times hypodermic injections of strychnine. At one time he made some improvement, but after about two months he again grew weaker and his speech-defect became more marked. In addition to this he had certain peculiar spasmodic movements of the lips, tongue, and jaws, more particularly of the tongue. He would go through movements as though he were licking his lips, or chewing movements which appeared to be

almost voluntary, but which he distinctly stated were not under his control. His speech at no time was particularly affected, the articulations being simply a little muffled. He was able to pronounce consonants, and he did not even have what would be termed a syllabic speech. It

FIG. 7.

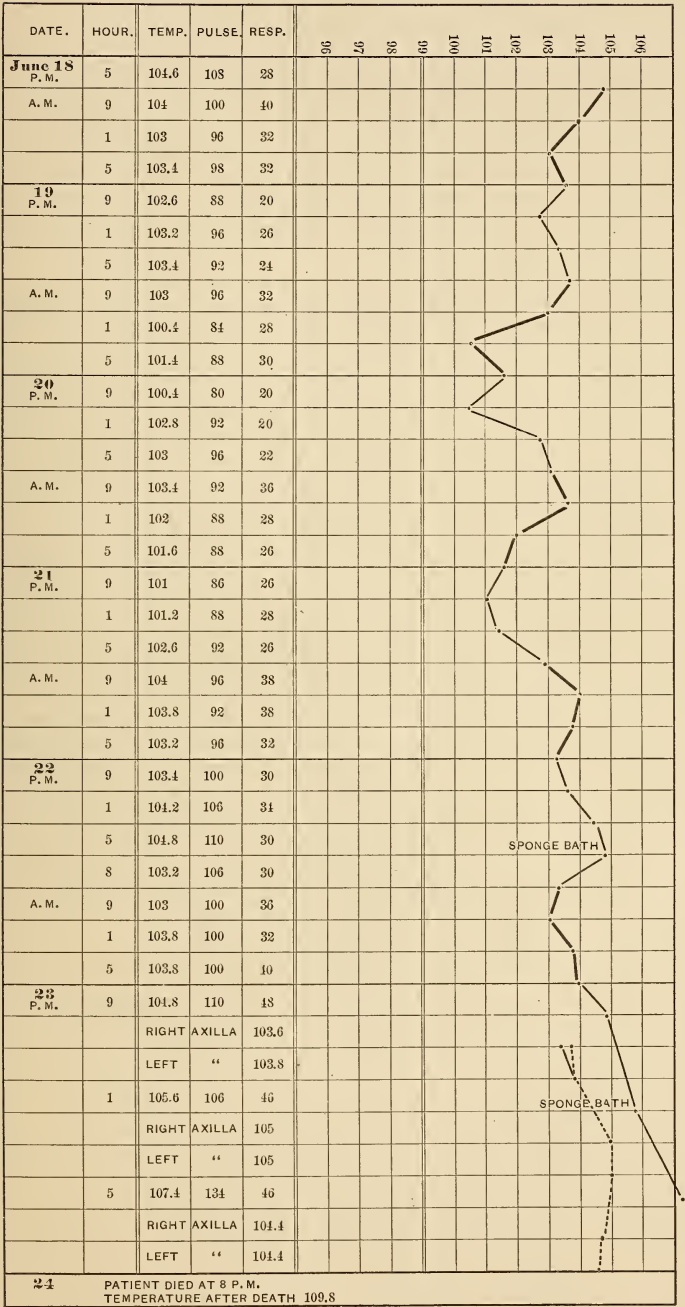


Showing patient's posture.

appeared as though his speech-disturbance was due more to stiffness and spasm in the tongue than to any actual paralysis. About June 15, 1894, the patient complained of chilliness and fever and about feeling extremely weak. He was obliged to go to bed, and there he remained until June 25th, when he died. During this time his temperature continued to range between 102° and 104° or 105° F. No definite cause could be found for this, the lungs remaining clear and he having no evidences of an inflammatory process anywhere. He suffered a little pain in the



FIG. 8.



back, especially in the lower part, but none in the arms or legs. The paralysis in the arm and the weakness in the legs increased, but there was no involvement of the sphincters. His mind continued clear, and he did not seem to suffer very much. In the last two days he became much weaker and the mind seemed a little clouded. During this time the house-physician, Dr. Watkins, tested his sensation in the legs and arm, and he informs me that there seemed to be some anæsthesia at that time. The temperature on June 23d began to rise steadily until on the evening of June 24th it had reached 109.8° F., and he died at that time. The appended temperature-chart represents graphically the results of the infection on the temperature. During the last hours of his illness he was unable to speak or swallow.

The post-mortem was made by the senior assistant house-physician, Dr. Russell, and I (Dr. D.) am indebted to him for pains taken in this matter. The brain, spinal cord, the brachial plexus on the left side, and a part of the ulnar nerve of the left side were removed. The portion of the spinal cord reaching from about the third to the seventh cervical nerves was not obtained. The brain, to gross examination, seemed somewhat congested but otherwise normal, although upon the surface of the pia mater in the neighborhood of the Sylvian fissure a few granulations were seen. The spinal cord on section in the fresh state was found to be soft in the neighborhood of the upper dorsal region, and on cutting it down through the dorsal region a spot of white softening could be traced extending along through the posterior columns. This perforating softened area gradually grew smaller, ending in the neighborhood of the lumbar cord. It was perfectly white and showed no signs of hemorrhage, nor were there any evidences of exudation or inflammation about the dura or pia mater. Section through the pons and medulla showed no apparent lesion. The tissues, however, were placed without extended examination in a solution of Müller's fluid and were then transferred to a 4 per cent. solution of bichromate of potash. The piece of the cord at the upper dorsal region was placed in alcohol for bacteriological examination. The pieces of cord which had been placed in alcohol and later subjected to bacteriological examination revealed the presence of tubercle-bacilli.

The methods of staining employed in this case were the hæmatoxylin method of Weigert, ordinary hæmatoxylin, hæmatoxylin and carminate of soda, carminate of soda alone, and a modified method of hæmatoxylin-staining by Dr. George R. Elliott (as yet unpublished). By means of these reagents the following findings were elicited:

In the cervical region, on account of the terminal tubercular myelitis, sections hardened in Müller's fluid and prepared for hæmatoxylin were very unsatisfactory, but degeneration in the crossed and direct pyramidal tracts with almost complete destruction of the anterior horns could be made out.

The third dorsal segment showed: *a.* Sclerosis of the crossed pyramidal tracts. *b.* Slight sclerosis of the ascending cerebellar tract. *c.* Diffusely distributed dilated bloodvessels, some with very much thickened walls. *d.* Extensive atrophy of the cells of the anterior horns. The cells are small and shrivelled-looking and their process stunted.

The eighth dorsal segment showed: *a.* Sclerosis of the crossed pyramidal tracts. *b.* Slight sclerosis of the ascending cerebellar tract. *c.* Bloodvessels with thickened walls, chiefly in the vicinity of the central gray commissure and in the pia mater.

The twelfth dorsal segment showed: *a.* Sclerosis of the crossed pyramidal tracts. *b.* Similar vascular condition to that higher up. *c.* Considerable cell-atrophy, most marked in the antero-internal and median groups.

The third lumbar segment showed: In addition to slight diffuse thickening and dilatation of the bloodvessels, there is a moderate degree of atrophy of the cells of the antero-internal and median groups of one side and the median of the other; slight degeneration of the crossed pyramidal tracts.

The fifth lumbar segment showed: Slight atrophy of the median groups of the anterior horn cells of both sides.

The ninth dorsal segment showed: *a.* Sclerosis of crossed pyramidal tracts. *b.* The bloodvessels much thickened, in places diffusely distributed through the cord and pia mater. Some of the bloodvessels are markedly dilated. *c.* At the extreme posterior part of the lateral column adjoining the pyramidal tract on one side is the site of old hemorrhage about the size of a pea. *d.* Some scattered cells in the anterior columns seem very much diminished in size without nuclei and without processes. *e.* In the anterior nerve-roots are dilated bloodvessels, together with slight increase of neuroglia-tissue.

At this level of the cord is seen a very interesting artificial displacement of the vesicular column of Clarke, which is pushed over to the opposite side, causing it to lie in juxtaposition with its fellow.<sup>1</sup> The remaining segments of the dorsal cord show conditions similar to those that have been described.

A section of the medulla at the level of the upper middle third of the twelfth nerve nucleus shows a considerable disappearance of the cells of the nucleus of this nerve, while many of the cells that remain are contracted, granular, without nuclei or processes, these changes being confined principally to the intraventricular portion of the nucleus. The outline of the nucleus would seem to be moderately preserved. Many of the fibres of the twelfth nerve in their course through the medulla show well-defined evidences of degeneration. In the substance of the nucleus there are many dilated bloodvessels and the dilatation of the perivascular spaces is particularly noticeable. Sections of the pons appear to present an entirely normal appearance.

Clinical summary of Case II.: Male, aged forty-eight years; onset of symptoms in October, 1893; temporary difficulty and indistinctness of speech and weakness in the left arm; the former gradually disappeared and the latter became worse gradually. Speech-difficulty recurred very soon and became permanent about December, 1893. Bulbar speech. Weakness of legs; difficulty in walking; increasing atrophy of left hand and arm. Mentally normal; sphincters physiological. Partial paralysis of the muscles of the left arm, forearm, and hand; hand-muscles most atrophied. No contractures. Tendon-reflexes greatly exaggerated. Diminution of electrical irritability in atrophied muscles. No sensory disturbances. Legs weak, left more so than right, and beginning atrophic changes. No difficulty in swallowing; no affection of the special senses. Course of the disease progressive: at first rather slowly, but later more rapidly, and for several days before death there were high temperature and evidences of some specific infection. With the excep-

<sup>1</sup> This artefact is fully described in the *Neurologisches Centralblatt*, No. 22, 1895.



tion of just previous to death, there had been no marked trouble with speech or swallowing. A peculiar symptom, spasmodic tasting, smacking movements of lips and tongue, quite involuntary and beyond control.

Summary of morbid changes: 1. A marked sclerosis of the crossed pyramidal tracts, moderate degeneration of the direct. 2. Marked atrophy of the cells of the anterior horns of the spinal cord. 3. Markedly dilated and thickened bloodvessels, rather diffusely distributed. 4. Atrophic changes in the cells of the twelfth nerve nucleus. 5. Destructive myelitis of the cervical region, tuberculous in character. 6. Hemorrhage, of ancient date, in the dorsal region.

The belief that the affection of the gray matter is secondary or deuteropathic in amyotrophic lateral sclerosis is more in keeping with the basic anatomical units of the nervous system, the neuron, than is the view taken by Leyden and Gowers. We know that the centre for nutrition of the neuron is the cell-body of the neuron, and that parts most remote from the cell-body are the first to show degeneration when the nutrition of the centre is affected. In the cases such as we have reported, and particularly in Case I., the slowly proceeding vascular degeneration caused, first, lack of nutrition in the perivascular lymph-spaces, and, as it is in these spaces that the ramifications of the end-brushes take place, it is easily conceivable that the degeneration will extend from such loci and gradually creep up the collaterals and axis-cylinder processes until the entire neuron or neurodendron is involved. This can be taken as the procedure for the changes in the principal neuron; *i. e.*, the one extending from the cortex to the anterior horns. The same vascular and perivascular changes acting upon the dendrites of the cell-body of the secondary neuron, and upon the cell-body itself, will have their deleterious results manifested in the terminal arborizations of the neuraxon, *viz.*, in the muscles, and the manifestation of it then will be muscular atrophy.

It is not only possible, but very probable, that in many cases of amyotrophic lateral sclerosis in which the lesion of the pyramidal tracts could be traced from the cortex to the periphery, such cases as were enumerated in the beginning of the paper, the degeneration may have had its starting-point in the ganglionic cells of the cortex which are the beginnings of the fibres of the pyramidal tracts, and extended from there downward; but the fact that the degeneration may occur in that way does not invalidate what has been said about the probable way in which the lesion developed in these cases. That is, it cannot be regarded that the former is the only way that the degeneration may take place, for even one thorough observation, which showed that the lesion in the pyramidal tracts did not extend above the pons, would prove the falseness of such a contention. That there have been plenty of such cases everyone must admit. In Case I., reported herewith, the most accurate methods of investigation were used; for instance, the method of

Marchi, which reveals with unerring accuracy any degenerating fibres which are present; but in this case the reaction of the tissues above the pons to the stain was that of normal fibres.

The etiology of the disease cannot be said to be directly contributed to by these two cases. Indirectly, however, they furnish us with much information of inferential value. When we have succeeded in making out a sequence of events to our entire satisfaction, when we know all about it, and the laws involved are so familiar that we seem to understand how such a beginning must have been followed by just such an end, we shall then be justified in applying such acquired knowledge as an explanatory principle to the etiology of the disease, thus determining its cause or causes.

The depravity of the vascular system was, to my mind, the main factor in the causation of the disease in the neuron. If this be granted, two questions only remain to be considered: the first concerns itself with the cause of the disease of the vessels, the second with the *raison d'être* of the selection of its deleterious consequences upon the neuron. The discussion of these two questions would involve the consideration of the causes of vascular degeneration as they occur all over the body, and, in addition, a theory of the causation of those organic nervous diseases which are not congenital (a group of diseases which, in the opinion of the writer, is steadily becoming more limited), such as the well-known theory recently resuscitated by Edinger. Into such a discussion I prefer not to go in this connection.

The significance of the tubercle-bacilli in the second case is not an easy matter to determine.<sup>1</sup> Whereas, the probability is that the tuberculous infection was a somewhat recent one and engrafted on the other disease, predisposed to by the perverted nutrition of the part, yet the opinion might laudably be advanced that the tubercle-bacilli played a more important rôle in the causation of the disease, but still no proof could be brought forward to support such a hypothesis.

From the point of view of symptomatology there are but two or three points to arrest our attention and call for discussion, and of these by far the most striking and uncommon one was the waves of spasmodic smiling and laughter in the first patient, and the involuntary chewing, quiet "smacking" movements in the second. Involuntary and uncontrollable expression of the emotions, either by laughing or crying, has been noticed and described in connection with several organic diseases of the central nervous system, particularly with hemiplegia of cerebral origin and with multiple sclerosis, but it has rarely been noticed in connection with amyotrophic lateral sclerosis, except by Marie (*Leçons de*

<sup>1</sup> The myelitis of tubercular origin will be considered more extensively in a subsequent communication.

*Maladie de Moelle*). Its explanation is a simple one, and its mechanism is a light or deep contraction of the inferior facial muscles supplied by the seventh nerve in the case of laughing, and of the fifth nerve in the case of chewing. We must conceive of a loss of a proper hold or tenacity of the nuclei of the fifth and seventh nerves on their peripheral belongings, or an excitation of these nuclei which causes a spasmodic movement in the mimic or masticating muscles, which passes off as soon as the nuclei readjust themselves. I have seen a similar phenomenon occur in two cases of bulbar paralysis, and, indeed, in one of them the spasmodic and impertinent attacks of uncontrollable laughter were the first symptom of the disease, which, later, ran a course significant of bulbar softening following a thrombosis.

The pain in the back of the head and neck and excessive rigidity and stiffness of the neck in Case I. were very striking, and considering the fact that it was asserted by the patient that they were initial symptoms, they at once suggested a diagnosis of pachymeningitis cervicalis or meningo-myelitis, but the presence of other symptoms, particularly the bulbar, and the absence of sensory disturbances quickly served to eliminate this suspicion.

The manner of onset in the second case is an extremely uncommon one and not devoid of interest, insomuch as it suggests that the first manifestations of the disease were in the medulla, and the fact that the speech-disturbance was temporary and repeated until it became secondary would lead us to believe that the actual process was a vascular one, the first attack and each succeeding one coinciding with some local ischæmia secondary to the diseased bloodvessels. We say ischæmia, because no evidences of slight hemorrhages or blocking up of vessels were found on histological examination, conditions which one might be led to suspect from the development of the symptoms; yet diseased and thickened bloodvessels were very conspicuous.



## REVIEWS.

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A TREATISE ON THE MEDICAL AND SURGICAL DISEASES OF INFANCY AND CHILDHOOD. By J. LEWIS SMITH, M.D., Clinical Professor of Diseases of Children, Bellevue Hospital Medical College, New York ; Physician to Charity Hospital ; Physician to the New York Foundling Asylum, etc. Eighth edition, thoroughly revised and greatly enlarged. With 273 illustrations and four plates. New York and Philadelphia : Lea Brothers & Co., 1896.

No work on the diseases of children has achieved greater success, or has deserved it more, than has the classic treatise of Dr. J. Lewis Smith, which still ably holds its own among a score of more recent and often more pretentious competitors. The appearance of the eighth edition, therefore, calls for passing notice, though it might be expected that little could be said in commendation that has not already been bestowed upon previous editions. A careful comparison, however, with the text of the seventh edition, which appeared in 1890, shows that the work of revision has been most admirably accomplished. It is indeed a tribute to the inherent excellence of the work, as we have already become familiar with it, that so large a portion of the text could be passed again unchanged through the fire of its author's maturer criticism, for the adoption of an entirely new typographical dress permitted the widest latitude in revision.

The most noticeable improvement, to begin with, is that which justifies the addition of "Surgical Diseases" to the original title-page. This portion of the new matter has been contributed by Dr. Stephen Smith, whose own work on *Operative Surgery* is a sufficient guaranty of its value. These chapters embrace the subjects of malformations and deformities, including those of the mouth, rectum and anus, of the urinary organs, and of the extremities ; injuries and diseases of the osseous system, namely, caries of the vertebræ, lateral curvatures, injuries of the skull and of the long bones, and diseases of the bones and of the joints ; foreign bodies in the air-passages and œsophagus ; surgical conditions of the mouth ; hernia ; and surgical affections of the bladder and urinary organs.

In Dr. Smith's own work satisfactory revision has been made in the subjects on which new light has been shed by recent research. In the section on Diseases of the Newly-born the chapter on Tetanus Neonatorum has been largely rewritten in accordance with the demands of its now accepted bacteriology. Rachitis has been completely rewritten, following the arrangement of Dr. Smith's valuable paper on this subject in the *American Text-book of Diseases of Children*, the only alteration being that the so-called "congenital rickets" is dismissed from the category of rachitis altogether, and is treated elsewhere under the special

heading of "Osteogenesis Imperfecta"—a change that is in accordance with the views of the most recent writers on this subject.

Naturally, the chapter on Diphtheria has received a good share of attention, and has been completely revised in accordance with the established bacteriology. The antitoxin treatment receives a fair, though somewhat conservative, consideration, the author's own experience in the New York Foundling Asylum being probably responsible for this. Thirty-one cases were inoculated, the strengths varying from 500 to 2200 units—12 cases on the first day, 17 on the second or third, and 2 on the fourth or fifth; while 19 received one injection, 9 two, and 3 three. It is to be regretted that nearly all the cases were instances of mixed infection. With this understanding the mortality of 55 per cent. is not by any means high, and fully 14 out of the 17 fatal cases died of broncho-pneumonia or broncho-pneumonia and croup.

It would seem to us an improvement if diphtheria, pertussis, and mumps, which the author has in all his editions associated with the exanthemata under the heading of "Eruptive Fevers," could have been classed by themselves; or, better, had the general heading been changed so as to cover more accurately these three infective, though certainly not eruptive, febrile affections.

The pathology of intermittent fever has been brought up to date, and further elucidated by several woodcuts of various forms of the plasmodium. Under constitutional diseases a new chapter has been added to cover the subject of cretinism and its modern treatment by thyroid-feeding.

A brief but adequate section on Diseases of the Blood, a subject not separately treated in the earlier editions, was contributed by the author's son-in-law and associate, Dr. Frederic M. Warner, whose untimely death occurred during the progress of the work of revision.

In the section on Diseases of the Digestive Apparatus we note that gastro-malacia has been finally dropped from the category of diseases; and that the treatment of appendicitis by prompt surgical intervention is judiciously urged. A short chapter on Peritonitis has also been added, embracing the author's views on appendicitis as an etiological factor; one could wish, however, that more space had been devoted to the chronic forms of peritoneal inflammation, which are merely mentioned. Another newly introduced section is on Diseases of the Circulatory System, embracing functional disorders and diseases of the pericardium, myocardium, and endocardium, and diseases of the bloodvessels.

Finally, the section on Diseases of the Skin has been recast and somewhat enlarged, and is further enriched by the addition of a formulary derived largely from the recent treatises of Kaposi and of Crocker.

A decided improvement has been made in the matter of illustrations, many of the old ones having been withdrawn and many new ones added, so that the total number is five times as great as that in the preceding edition.

The only point demanding adverse criticism is the index, which seems to have escaped the general spirit of improvement.

Altogether, Dr. Smith is to be congratulated, and when we say that this is a decided improvement upon former editions of his popular classic, those who have known and prized his earlier work will acknowledge that this is praise indeed.

L. S.

THE TOXIC AMBLYOPIAS. By G. E. DE SCHWEINITZ, A.M., M.D. Pp. 238. Philadelphia and New York: Lea Brothers & Co., 1896.

THE essay of Dr. de Schweinitz, to which was awarded the Alvarenga Prize of the College of Physicians of Philadelphia, is an exhaustive treatise on all amblyopias which are caused by the influence of toxic substances.

The author, recognizing the difficulty of presenting any classification free from objection, adopts an arrangement based upon prominent physiological and toxic actions. In the first class he gives a prominent place to alcohol and tobacco. Of the former the author states at the outset that his experimental work in acute alcoholism in rabbits and dogs, undertaken for the purpose of observing whether or not optic nerve-lesions could be produced, showed generally negative results. He agrees with Fuchs that to produce chronic alcoholic poisoning two factors are required, namely, the consumption of a sufficient quantity of alcohol for a long time, and the presence of fusel oil in the drink, and especially does he think that it is the abuse of spirits—*i. e.*, whiskey, brandy, and, we may add, schnapps—that is capable of originating visual disturbance, rather than of the milder beverages. He reviews the cases analyzed by Uthhoff at Schoeler's clinique in Berlin, and gives a table showing that of the toxic amblyopia cases observed among 30,000 patients, the disease always being bilateral and the patients males, alcohol was the most frequent cause of amblyopia, its frequency being to that of tobacco as 64 is to 23.

In observing the relative frequency of this disease among men we should not lose sight of the many influences at work, namely, the varying occupations of the two sexes, the exposure of men to cold, bodily and mental excitement, and exhaustion, and the other nervous disorders, such as tabes, so much more prevalent among men.

Of the most common general symptoms the author enumerates tremor, insomnia, irritability, restlessness, and gastro-intestinal disturbances. Of the ocular symptoms which are more or less characteristic of toxic amblyopia he summarizes: Pathological whiteness of the temporal half of the optic papilla; occasional haziness of the nerve-head or hyperæmia of its surface. In the earlier stages a relative scotoma for red and green is present in the field of vision. The significance of this central color-scotoma as a diagnostic point was many years ago well described by Leber. Various charts of the visual field are given from Uthhoff, showing the central scotoma for red and green, together with other and more infrequent scotomata for blue, together with peripheral contraction of the color-fields without central scotoma.

The author wisely, we think, disagrees with Hirschberg in his attempt to establish a differential diagnosis between tobacco-amblyopia, alcohol-amblyopia, and the mixed types of the affection by the form of the scotoma, and he discards the alleged *para*-central scotoma in tobacco-amblyopia and the *peri*-central scotoma in alcohol-amblyopia.

Of the pathological anatomy of the amblyopia produced by the abuse of alcohol or tobacco the author adopts very largely the views of Uthhoff, and gives in considerable detail this writer's observations. His summary is as follows: Most of the investigations show that the anatomical basis



of this affection consists of an augmentation of nuclei, hypertrophy of the connective tissue, and wasting of the nerve-fibres of a limited portion of the optic nerves known as the papillo-macular bundle; in fact, that there is an interstitial, sclerosing inflammation, comparable, according to Samuelsohn, to the same pathological process which alcohol produces in the liver—for example, in interstitial hepatitis.

In his chapter upon Amblyopia from the Abuse of Tobacco Dr. de Schweinitz has brought together a mass of interesting material, much of it from competent observers in America, the whole a valuable *résumé* of the literature of this subject. The author rightly draws attention to the quality as well as the quantity of the tobacco which is smoked. That the cheaper tobacco contains often more nicotine, and is consequently more deleterious, has been long known. The reviewer of this treatise recalls many cases of tobacco-amblyopia occurring among the cab-drivers of Berlin. An inferior, very dark, and cheap cigar was and doubtless is still sold to this class of men, and the quantity consumed is enormous. As to the scotoma in tobacco-amblyopia: in the beginning it is a relative color-scotoma of which the patient is conscious. Later there may be a scotoma for white, and, if the case is severe, the scotoma becomes absolute. According to Groenouw, it never reaches more than a degree or two beyond the nasal side of the point of fixation. A second scotoma may be demonstrated around the blind spot, and these two color-blind areas are joined by a process which extends from the fixing-point, thus forming the fully developed egg-shaped scotoma. The author is undoubtedly right in his statement that permanent changes in the disk may occur in cases of long-standing tobacco-amblyopia, and probably complete atrophy may result if the use of tobacco is continued. The author holds, with the majority of writers on this subject, that in the tobacco-amblyopia the pathological process is in the optic nerve, and especially in that portion which is known as the papillo-macular bundle. To the general conclusions of the author as to the treatment of intoxication-amblyopia we can but agree. In the majority of cases it is useless for the patients to temporize or merely to lessen their accustomed consumption of these drugs. Absolute cessation from smoking and drinking will, if the disease has not progressed far, be sufficient to effect a cure. There may be cases in which resource must be had to drugs which are known to stimulate the optic nerve, and among these strychnine has a foremost place. Of the value of pilocarpine, Turkish baths, and, under proper conditions, of bromide of potash, due credit is given in these pages. At the end of his chapter on the abuse of tobacco, especially interesting is the reference to the observations of Husemann on Epizootic Blindness in Horses, a form of amaurosis which is prevalent in New South Wales. This disease is thought to be due to the Australian tobacco (*nicotiana suaveolens*), the leaves of which are eaten by the horses. As the author well says, should future investigations confirm the accuracy of these observations, the reality of tobacco-blindness would be proved beyond cavil, as the cases practically assume the importance of a physiological experiment.

In a succession of chapters cases have been collected from various authors of amblyopia from bisulphide of carbon, iodoform, nitrobenzol, the coal-tar products, arsenic and lead, the anæsthetics, opium, chloral, bromide of potassium, cannabis indica, caffeine, and them.

The author suggests the following syllabus of symptoms from the ophthalmoscopic appearances in lead-poisoning :

1. Transient amblyopia, without ophthalmoscopic change, due to an anæsthetic action of the lead on the retina and optic nerve, and not unlike amaurosis from uræmia without fundus-lesions.

2. Permanent amblyopia, without distinct fundus-changes, or, at most, some hyperæmia of the nerve-tip and undue filling of the retinal circulation, due to a retrobulbar neuritis, analogous to that occurring under the influence of other toxic agents. This type may terminate in blindness from optic nerve atrophy.

3. Optic neuritis or neuro-retinitis, either especially due to the lead or secondary to changes in the brain or kidneys.

4. Optic nerve atrophy, either consecutive to a plumbic papillitis or due to the primary effect of the lead on the visual apparatus.

5. Various types of retinitis, often due to lead-nephritis, but also primary and appearing in the form of vasculitis and perivasculitis.

The chapter on Quinine Amaurosis, containing the author's researches in producing quinine-blindness in dogs, noting the reproduction of the clinical picture in human beings, together with the microscopic examination of the optic nerves, chiasms, tracts, and visual centres, is an admirable summary of the subject.

The dose of quinine which causes blindness he finds to vary from fifteen grains to an ounce in twenty-four hours. The ocular symptoms of the milder type consist of temporary amblyopia, diminution of accommodative power, and sometimes, not always, moderate dilatation of the pupil. Under the influence of the larger doses the blindness becomes complete and may develop with great suddenness.

In his experimental quinine-blindness in dogs the author found the loss of vision in some instances to be total at the expiration of two months. The ophthalmoscopic phenomena in complete cases consist of pallor of the optic disk, diminution in the size of both the veins and arteries of the retina, and occasionally a grayish haze of the retina and a sherry-colored spot in the macula. Charts of visual fields showing concentric or elliptic contraction, occurring in cases reported by Knapp, Gruening, Browne, Mellinger, and Tiffany, are given.

In his *résumé* of experiments upon dogs the author says of the microscopical appearances, that there are thickening and changes in the walls of the optic nerve vessels, organization of a clot, the result of thrombosis ; widening of the infundibulum of the vessels ; and, finally, practically complete atrophy of the visual path, including the optic nerves, optic chiasm, and optic tracts, as far as they could be traced.

This essay of Dr. de Schweinitz presents as fully as any work with which we are familiar our knowledge to-day of the drugs that have been proved to produce toxic amblyopia in the true sense of the word. In the case of those drugs in which further observation is needed to place them in this category, the author has laid before his readers such facts as he has found in a wide survey of literature, leaving their claim to such a place to be established by additional observation. Opium, hydrate of chloral, bromide of potassium, cannabis indica, nitrous oxide, may be mentioned among those whose claim to produce toxic amblyopia have not been entirely proved.

R. H. D.

TWENTIETH CENTURY PRACTICE. AN INTERNATIONAL ENCYCLOPÆDIA OF MODERN MEDICAL SCIENCE BY LEADING AUTHORITIES OF EUROPE AND AMERICA. Edited by THOMAS L. STEDMAN, M.D. In twenty volumes. Vol. IV. New York: William Wood & Co., 1895.

MORE than half of this volume is given to Diseases of the Heart and Pericardium under the sole authorship of J. T. Whitaker. We have in it, therefore, a monograph on a very important subject, and one not recently handled in detail by an American author. The chapter is treated in an encyclopædic manner, beginning with an historical note on the development of the study of cardiac disease. The arrangement of the matter follows conventional lines, but the amount of information given is quite unusual. It includes not only descriptions of observed facts, anatomical, clinical, and therapeutic, gathered from various sources, but also all the more important theories in all parts of cardiac pathology, and many interesting and philosophic remarks by the author. All this is stated so aphoristically that he who reads running will probably pronounce the chapter hard, but it will well repay close study and will long prove a source of profitable information to those who turn to it. The total absence of references is to be regretted.

Equally valuable are the next two chapters on Diseases of the Blood-vessels, by A. E. Sansom, and Diseases of the Lymphatic System, by Bertrand Dawson. In the former, diseases of veins, so often important in practice, are given more than the usual space.

One hundred and twenty-five pages are devoted to Diseases of the Thyroid Gland, appropriately assigned to George R. Murray, whose part in the modern study of the subject is well known. The chapter includes Myxœdema, Cretinism, Exophthalmic Goitre, and Goitre, with the most important malignant and infectious diseases of the gland. The whole chapter is full of originality and up-to-date, though published too early to notice the interesting discovery, by Baumann and Roos, of the iodine-storing function of the gland. The thyroid origin of exophthalmic goitre is given the preference in accordance with prevailing views, though the other theories are clearly and impartially stated. The remarks on treatment, as we might expect, are admirable. A useful bibliography adds to the value of the chapter.

Altogether, the present volume is almost indispensable to the physician who wishes to be thoroughly informed on the topics included in it. Aside from a small number of errors in the spelling of proper names, there are a few others, as well as some unimportant omissions. "Radical" (p. 254) is doubtless intended for radial. In connection with Corrigan and his pulse, it seems strange not to find the term he is said to have used. "Water-hammer" is certainly heard more frequently, as it is also more descriptive, as applied to the pulse of aortic insufficiency, than "cannon-ball" or "pistol-shot." As to Sée's term, *pulsus celer*, it might have been remarked that Hope long ago used the much more accurate expression, *celer et infrequens*.

The nomenclature used in this volume is peculiar. Latin and English terms are intermingled without any apparent reason. The mechanical execution of the book is good, and both editor and publishers are to be congratulated on the promptness with which the volumes appear.

G. D.



# PROGRESS OF MEDICAL SCIENCE.

## THERAPEUTICS.

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UNDER THE CHARGE OF

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## ANIMAL-EXTRACTS.

DR. HORATIO C. WOOD presents a very just *résumé* of the present condition of this subject. After stating that there is neither reason nor science, nor yet good clinical observation in support of the value of any of the drugs used by isopaths, he gives a very scientific presentation of the present views in regard to the therapeutic use of these substances. The ductless glands form some substances which have relations with all the tissues, and which modify everywhere protoplasmic movements. We have a firm, scientific foundation for the use of thyroid-extract in myxœdema. In hypertrophy of cicatricial tissues, simple goitre, and obesity, it should be tried; in exophthalmic goitre it does harm. Splenic extract has apparently cured one, and much benefited two others, of the last-named conditions. In Addison's disease sometimes benefit is obtained from the use of glycerin-extract of suprarenal capsule. There has been no great success from the use of extracts of bone-marrow and of the spleen in leucocythæmia. There is sufficient evidence to warrant the use of medullary glyceride in cases of severe anæmia. The antitoxins have been used in tetanus, diphtheria, erysipelas, and in other infections. In one case of tetanus, which had a fair chance of recovery under the older treatment, death took place from exhaustion, with a rapid rise of temperature, suggesting that this result was referable to the antitoxin. As for diphtheria, the value of the treatment has been sufficiently shown, so that every conscientious physician should use this just as much as he would quinine in malaria. Of course a [Klebs-]Loeffler bacillus antitoxin is useless against a streptococcus toxin, and in many [and perhaps most] cases death results from streptococcus-infection. Theoretically, then, the two antitoxins should be used in most cases of advanced diphtheria. Marmorek has reported the use of the streptococcus antitoxin, and on the whole the reports of Pozzi, Dieulafoy, Kelly, Sevestre, Cuffer, and Bar have been favorable. In any case of septic infection a cultivation is rarely necessary to be made, for the clinical

features, in most cases, are sufficient to distinguish the cases. An infection which is localized produces freely of pus, has but little tendency to run, is usually due to a streptococcus; one which produces serous or ichorous, rather than purulent exudation, and rapidly courses along the lymphatics, or gives rise to erysipeloid symptoms, is the result of the labors of the streptococcus.—*University Medical Magazine*, 1896, No. 7, p. 483.

#### THYROID-THERAPY.

DR. F. WINKLER, in a careful *résumé*, concludes that it can be definitely stated that in benignant struma the use of thyroid-extracts is successful; on the contrary, in Basedow's disease, it is uncertain. After the use of fresh thyroids Statel notes that from four to six weeks after its discontinuance the struma returned and steadily progressed; therefore it is recommended that the treatment should be continued for several weeks after the complete disappearance of the disease. The tablets seem to be less likely than the fresh thyroids to give rise to unfavorable effects upon the heart. The more recent results in nervous and mental diseases have been the successes of Bramwell, Gottstein, and Levy-Dorn (see *AMERICAN JOURNAL OF THE MEDICAL SCIENCES*, vol. cxi. p. 587) in tetany. Macphall and Bruce have treated thirty cases of various psychoses with tablets, and find that they are contra-indicated in acute mania and melancholia with rapid emaciation, in incompetent heart-valves and pulmonary tuberculosis. On the other hand, Morin, from his observations that individuals afflicted with goitre remained healthy while others perished from pulmonary tuberculosis, advances the hypothesis that in the thyroid gland we have a marked protection against tuberculous infection, and therefore advises the use of this remedy for these conditions. As showing the individual peculiarities in reaction from the administration of thyroid pastilles [tablets] may be cited the case of Becker, who reports that a child, twenty-seven months old, swallowed ninety of these, each of five grains. Two hours later they could not be recovered by either stomach-tube or emetics. No poisonous symptoms appeared, and there was no loss of weight.—*Centralblatt für die Gesamte Therapie*, 1896, Heft 3, S. 143.

DR. SCHLESINGER, in a single instance of obesity, has obtained a marked diminution of weight during six months' use of tablets of British manufacture. When thyroids of the ox were substituted for those of the sheep the patient recommenced to grow fat. This was explained by the fact that the former does not contain the organic combination of iodine which is ordinarily called thyroidine. The thyroid-treatment of obesity, goitre, Basedow's disease, acromegaly, pseudo-leukæmia, and malignant lymphoma has given but one result—a diminution of flesh. In no case was there any intoxication; the only formal contraindications are albuminuria and glycosuria.—*Gazette hebdomadaire de Médecine et Chirurgie*, 1896, No. 21, p. 252.

#### THE TREATMENT OF GRAVES'S DISEASE.

DR. FRANCIS KINNICUTT, incidentally to a discussion of the thyroid origin of this disease, mentions an especial susceptibility of patients suffering from it to the action of the thyroid extract. Large doses invariably produce pulse-acceleration and palpitation, the temperature rises above normal, the skin

becomes flushed and moist. If the remedy is pushed, then follow insomnia, restlessness, polyuria, diarrhoea, and often fine tremor. In many cases, however, its administration is unattended with appreciable aggravation of symptoms. The good results from the use of belladonna are probably due to its power of inhibiting to a greater or less degree the functions of the secreting glands. Murray has found that the inunction of red mercuric iodide over the enlarged thyroid causes a distinct diminution in the symptoms of the disease. The results obtained by Kocher by dietetic treatment and use of the phosphates has been sufficiently encouraging to emphasize the hope that other than a surgical treatment of these patients may be found. At present the two operations chiefly advocated are ligation of the thyroid arteries and partial thyroidectomy.—*The Medical Record*, 1896, No. 1328, p. 541.

#### ARECOLINE HYDROBROMATE.

M. MONQUET, from the results obtained upon two horses, concludes that this drug acts as do eserine and pilocarpine combined, and, further, that its activity is greater than that of these drugs—arecoline produced a salivation at least equal to that of pilocarpine, the dose-proportion being 5 to 40. If its use should become common, it will be cheaper than the latter drug.

DR. E. BARDET calls attention to the fact that the drug above studied comes nearer to pelletierine than to eserine and pilocarpine; areca nut has been successfully used as a tæniacide. It is proper, in view of its energetic action, to commence with small doses—one thirty-second to one-sixteenth of a grain.—*Les Nouveaux Remèdes*, 1895, No. 22, p. 505.

#### SULPHONAL-EXANTHEMATA.

DR. MAX WALTERS notes the previously reported cases, generally of erythema resembling scarlet fever, and reports two personal cases. He remarks that the eruption is mostly located in the follicles, and thence through confluence the efflorescence spreads, becoming large, reddened areas; in addition, vesicles are noted. On the whole, the resemblance is to scarlet fever, which rarely, also, shows vesicles.—*Therapeutische Monatshefte*, 1895, Heft 12, S. 656.

#### THE TREATMENT OF TYPHOID FEVER.

DR. WILLIAM OSLER finds, from five years' experience with the cold bath, that many circumstances interfere with the systematic carrying out of the plan—admissions during the second or even the third week, with a falling thermometer and the temperature constantly below 102.5°; late admissions of patients too ill to bathe; serious complications, as hemorrhage, signs of perforation, very intense bronchitis, pneumonia, pleurisy, or intense meteorism, with severe diarrhoea; cases of doubtful diagnosis; and, finally, the substitution of cold sponging. However, his experience shows that there are a mitigation of the general symptoms of the disease and a reduction in the mortality. Although he enforces the method for its results, he is not enamored of the practice, and hopes for a method which may be equally life-saving, and, to put it mildly, less disagreeable.—*The Canada Lancet*, 1896, No. 8, p. 259.



DR. A. J. DOWNER advocates the application of cold to the abdomen by means of ice-bags over the lower coils of the ileum and the beginning of the colon, for the longest periods and with the shortest intermissions consistent with safety; the object being to obtain as low and constant a temperature as possible near the lesions and the infective process. The continuous use of the ice-bags causes congestion, and in time sloughing of the skin; hence the necessity for regulated intermissions. The best rule to follow is to apply for one and a half hours, then to remove the bag for one-half hour. Should the temperature rise to or above  $103^{\circ}$  F., the ice may be allowed to remain on for an hour and three-quarters, which is followed by a fifteen-minute intermission. In temperatures above  $102^{\circ}$  F., sponging with iced-water and alcohol during the intermission is an essential part of the system. The ice is removed in all cases when  $99^{\circ}$  F. is reached. The effects of this method are: 1. Some inhibition of the lesions—the arterial supply to the bowel is lessened by the stimulating action of cold upon the arterioles. 2. A similar effect is obtained on the efferent lymphatic vessels from the lesions—their calibre is diminished and less toxin is absorbed. 3. There is an anti-bacillary and anti-infectious influence. 4. And, lastly, there exists a physical antithermic influence. Eleven instances are reported. It is believed that this treatment will render mild all cases in which it is begun before the fifth day of the disease, and as much influence and safely guide later cases as any method of treatment.—*Therapeutic Gazette*, 1896, No. 3, p. 151.

DR. ROBERT M. SIMON has come to rely upon the use of oil of turpentine as advocated by Wood—fifteen drops to be given in mucilage, with the addition of one minim of liquor potassæ every four hours. Turpentine is not only a good antiseptic, but it is a cardiac tonic, and tends to arrest hemorrhage. We must have better evidence of the benefits to be gained from the toilsome method of the cold-bath treatment before it is likely to become universally adopted. It is true that we succeed in maintaining a lower average of temperature, but the course of the disease is not checked, and we find, on the authority of Cayley, that there is an increase in the number of relapses. Opium is dangerous, in so far as it interferes with the digestive processes; but he would prefer that his patients should for a time live on water than that they should continue to suffer from the restlessness and want of sleep and mental excitement so characteristic of the disease. The majority of our cases, however, neither need nor get opium; but nothing short of severe bronchitis is a contraindication to its use when indicated from mental condition or sleeplessness. Alcohol is a dangerous remedy if there be hemorrhage due to perforation of a bloodvessel, or if the pulse be full and bounding. If it does not slow the pulse, it should not be given. If administered, it is better in a relatively large dose when the need arises than in smaller ones at stated intervals. No liquid combines the elements of an ideal food as milk, and preferably when peptonized and given in limited quantities about every three hours. Two and one-half pints [in a day] are ample for an adult. Beef-tea is rarely necessary, and should never be given if diarrhœa be present. Cold water to relieve thirst may be freely given, and if a desire for tea be expressed there is no reason to withhold it.—*British Medical Journal*, 1896, No. 1838, p. 709.

## THE TREATMENT OF CIRCULATORY DISORDERS.

DR. H. A. HARE calls attention to the importance of recognizing the vasomotor system as a factor in disease in the treatment of these conditions. For vasomotor relaxation belladonna is our standby and mainstay, and lives have been saved by its use in shock and in the collapse of acute disease. One instance is cited: A child of five years, having passed through the earlier stages of pneumonia rather uneventfully, arrived at the crisis. On that day he sat up in bed for an instant, and, although the pulse was already weak from the fall in fever, passed into profound collapse. In addition to external heat,  $\frac{1}{60}$  grain of strychnine with  $\frac{1}{200}$  grain of atropine was given hypodermatically every fifteen minutes, until three doses were used, when the child showed signs of renewed vitality, became flushed from the atropine, and eventually recovered.—*Therapeutic Gazette*, 1896, No. 3, p. 139.

## NAUHEIM AND THE SCHOTT TREATMENT OF DISEASES OF THE HEART.

DR. ROBERT L. BOWLES has directed his attention chiefly to (1) the possibility of reducing the size of a dilated, enlarged, and diseased heart (*a*) by baths, or (*b*) by exercise; (2) whether this reduction, if produced, was beneficial and permanent; and (3) the state of the heart before and after treatment. The first seemed to occur, and in unpromising cases there was surprising improvement in the general symptoms and in the recovery of compensation.

DR. H. NEWTON HEINEMAN states that many cases of heart-disease require treatment for the heart-condition, likewise the association of a disordered stomach, or liver, or other slight intercurrent ailments are often sufficiently well treated, when this secondary disease is alone disposed of. So far as the nature of the valvular lesion is concerned, this affords less certain indications for the application of this treatment than does the condition of the heart-muscle itself, to wit, the question of the degree of myocarditis, and more especially the amount or loss of compensation. The contra-indications are arterio-sclerosis when in an advanced stage, aneurism in every but its initial stage, acute Bright's disease, and the atrophic form of chronic Bright's disease. In many instances patients have, by the use of this treatment, been enabled to continue their ordinary occupations. This treatment, however, is not a panacea for every case of heart-disease, but there are few forms of which some cases will not, more or less often, receive some benefit. If we keep in mind what we may expect in cardiac disease, this plan of treatment will more than fulfil our anticipations.—*Medical Press and Circular*, 1896, No. 2969, p. 339.

DR. WETHEREL considered that in a great measure the success of Nauheim depended upon the strict *régime* which patients were compelled to follow. If patients at home would consent to submit to the same rigid rules of life, he saw no reason why the treatment, especially the exercises, should not be adopted. The most suitable cases were those of dilated heart without valvular mischief, and neurotic cases, although many cases of valvular disease obtained much benefit. The treatment of Graves's disease was not so satisfactory.—*Idem*, p. 345.

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MEDICINE.

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UNDER THE CHARGE OF

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AND

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## PRETUBERCULOUS POLYURIA.

DAVID has recently studied a new syndrome associated with beginning tuberculosis, which is stated to have been first discovered by A. Robin in 1894.

The main symptom consists of polyuria, which, in these cases, always precedes tuberculosis.

The disease is seen usually in young men of from twenty to thirty years of age, and with a nervous temperament.

The onset of the symptoms is usually abrupt, with fever, weakness, and pains in the loins, but these symptoms disappear in a few days, when the polyuria occurs.

Blood and fatty material are found in the urine, and the chlorides and phosphates are increased.

The thirst is much increased, as in all polyurias, but the appetite, instead of being increased, is diminished, and vomiting and diarrhoea may be observed.

Instead of the lowered temperature seen in ordinary polyuria, there is fever, and the temperature may be very irregular, with great oscillations.

The signs of tuberculosis may appear at the same time as the polyuria, or may not be made out until a short time after this.

The polyuria generally diminishes gradually after its sharp onset. The form of tuberculosis usually associated with this syndrome is a chronic one, with almost complete absence of hæmoptysis and night-sweats.

David thinks that the increased amount of urine should be kept up if possible, as it is a means of eliminating poisonous products.—*Revue de la Tuberculose*, December, 1895.

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## INTESTINAL CALCULI.

MONGOUR reports the case of a young woman of thirty-one years, arthritic and neurotic, who had suffered for six years from digestive disorders in the form of flatulent dyspepsia, with dilatation of the stomach. The symptoms of muco-membranous enteritis came on early in 1895, with sharp abdominal pain, tenderness along the course of the colon, and obstinate constipation. After passing a large amount of muco-membranous material over a period of six or seven months, the patient began to notice small stones in the passages.



Most of these stones were about the size of orange-seeds, the largest as big as a nut, and their discharge lasted two or three weeks. The concretions were of a yellowish-white color, and very friable, some of them presenting conical elevations on their surfaces, others smooth. They were homogeneous on section, and did not contain any central nucleus. Chemical examination showed the stones to be composed principally of carbonate of lime and phosphates of magnesia, with a small amount of organic matter, iron, and water.

The urine at the time that the stones were being passed was normal. Mongour thinks that the process of formation of these stones is similar to that of gall- and kidney-stones, and cites Dieulafoy as stating that he has seen several examples of the three forms of lithiasis in the same family.—*Comptes Rendus de la Société de Biologie*, February 28, 1896.

#### RUPTURE OF THE HEART.

KOUSKOFF reports a case of this rare occurrence which he says he has only observed three times in eight thousand autopsies.

The patient was a professor in the University of Kieff, in whom the autopsy was made fourteen hours after death.

The previous history of the patient was negative, and he was suffering at the time of death with symptoms of la grippe, which had lasted about ten days. The sputum had been bloody, likewise the stools, and there was slight cough, but the temperature had not risen above 37.5° C. Death occurred suddenly, the patient complaining of feeling faint a few moments before he died.

The autopsy showed a dilated pericardial sac containing seven hundred grammes of partly coagulated blood; a rupture of the heart was seen on removing this. The rupture was situated on the anterior wall of the left ventricle, and was about four centimetres in length. The heart was increased in size, and the whole wall of the left ventricle was bulged out, resembling an aneurism. The cardiac muscle in the neighborhood of the rupture was of a pale-yellowish color, soft, and entirely necrotic. In the descending branch of the left coronary artery, of which the origin was free, was a mixed clot two centimetres long, obliterating the lumen of the vessels. There was marked sclerosis of the aorta.

Kouskoff thinks that in this case the arterio-sclerosis led to thrombus-formation, and that a portion of the thrombus was dislodged and plugged the coronary artery. The necrosis of the heart-muscle resulted from this plugging, the actual rupture being probably due to undue stimulation of the heart, perhaps caused by catheterization, which had been practised just before death.—*La Presse Médicale*, March 18, 1896.

#### THE RELATION BETWEEN BRIGHT'S AND PROFESSIONAL CRAMP.

In a recent note BONNIER calls attention to the fact that it has long been known that Bright's disease may be associated with cramps of various kinds, and suggests that cases of professional cramp may be associated with Bright's.

He relates a case in point of an individual, a telegrapher, who, following an attack of smallpox, developed a professional cramp, and showed symp-

toms of nephritis. He was subjected to various treatments without avail, and finally underwent a great improvement on a milk-diet, the Bright's disease having been recognized by this time.

Bonnier suggests that the urine should be carefully examined in all cases of professional cramp, more especially in the chronic and obstinate cases.—*Comptes Rendus de la Société de Biologie*, February 21, 1896.

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#### THE CLINICAL VALUE OF ELSNER'S METHOD OF DIFFERENTIATING THE TYPHOID BACILLUS.

In a recent article CHANTEMESSE calls attention to the value of the Elsner method of differentiating the typhoid from the colon-bacillus, and of isolating the typhoid bacillus from the stools.

He states that out of sixteen cases he was able to obtain the typhoid bacillus by this proceeding in thirteen, and notes that in two of the three unsuccessful attempts the failure was probably due to imperfect technique.

Of the thirteen cases three merit special attention, as the bacteriological examination was of great value in clearing up the diagnosis. In the first of these cases a young girl was admitted to the hospital, and after some days of fever a probable diagnosis of typhoid was made; the temperature, however, dropped suddenly, and the clinical diagnosis was doubtful, but was cleared up by finding the bacilli in the stools. A second patient was admitted in an alcoholic condition, complaining only of weakness. He had no fever, and at first was supposed to be a paretic with alcoholism, but an examination of the stools revealing the presence of typhoid bacilli, a history of a recent attack of typhoid was elicited.

A third patient was admitted to the hospital, afebrile, with photophobia; contraction of the fields of vision, and hemianæsthesia. The case was thought to be one of hysteria, but typhoid bacilli being found in the stools, a history of the patient having had fever, diarrhœa, and vomiting fifteen days before admission, was elicited.

Chantemesse points out the fact that by means of this medium an early diagnosis can be made, and obscure cases can be cleared up.—*Comptes Rendus de la Société de Biologie*, March 5, 1896.

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#### PYLORIC STENOSIS FOLLOWING CHOLELITHIASIS.

BOUVERET, in a recent paper, records fresh cases of this form of pyloric stenosis, and states that it is, with the exception of very rare cases of congenital stenosis, the least common of all forms.

The author points out the close relations which normally exist between the gall-bladder and the pylorus, and observes how frequently adhesions take place between the two organs as a result of inflammation originating from one or the other.

The actual stenosis of the pylorus, after adhesions have formed, can occur in one of several ways: 1. From the organization and contraction of the plastic exudate resulting from the localized peritonitis. 2. From spasm of the pyloric sphincter caused by contraction of the loaded stomach or the irritation of neighboring inflammatory lesions. 3. From fixation of the pylorus by firm adhesions, the presence of food in the stomach pulling the

organ down and causing an angular bend at the pylorus, which narrows its lumen. 4. From the presence of a large stone fixed in the duodenum, and either occluding it or the neighboring pylorus.

In arriving at a diagnosis of stenosis due to or following gallstones the author lays particular stress on eliciting a previous history of gallstone colic or of having passed gallstones per rectum.

The symptoms and signs are similar to those of pyloric obstruction from other causes for the most part.

One symptom, however, the author calls attention to in connection with the stenosis due to fixation of the pylorus, and this is that the vomiting and symptoms of dilatation persist as long as the individual is active and on his feet, but cease when he rests in a recumbent position.—*Revue de Médecine*, January, 1896.

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#### THE RÔLE OF MICROBES IN THE FORMATION OF GALLSTONES.

GILBERT and FOURNIER publish an interesting account of their bacteriological researches upon gallstones, with relation to their causation.

The stones which they examined were obtained for the most part from human beings, in a few instances from cattle, the age of the stones varying in different cases.

In all the old gallstones, with one exception, cultures and cover-glass preparations were negative.

In the stones of a moderate age the cover-glass preparations showed at times organisms more or less degenerated, and which did not grow on culture-media.

The fresh stones almost invariably gave positive results, both on cover-slips and in cultures, the organism isolated being with but one exception the colon-bacillus.

After finding that bacteria were present in the stones, the authors made a series of careful experiments with sterile stones, which showed that these could not be penetrated by the colon-bacillus when subjected for a considerable length of time to liquid cultures of this organism.

They conclude that cholelithiasis is of infectious origin, the stones being caused by the presence of the microbes found within them. Different microorganisms may cause the formation of biliary calculi, but by far the most common one, both in man and animals, is the colon-bacillus.—*Comptes Rendus de la Société de Biologie*, February 14, 1896.

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#### PSEUDO-GENERAL PARESIS OF HEPATIC ORIGIN

JOFFROY, at a recent meeting of the Hospital Society of Paris, spoke of a form of pseudo-general paresis which accompanied diseases of the liver.

He reported the case of a sea-captain, of alcoholic habits, who was subject to attacks of jaundice. This individual was suddenly taken with difficulty in walking, and had an apoplectiform attack, following which he remained in an apathetic state, and had some motor disturbances of the tongue and lips, in the form of a suction movement. His speech was slow and rather scanning, similar to that of disseminated sclerosis. A diagnosis had been made of general paresis, with which Joffroy did not agree, as fibrillary twitch-



ings of the tongue and lips were absent and the pupils showed no inequality. The examination of the urine showed the presence of urobilin, and a diagnosis was made of mental derangement secondary to disease of the liver.

This diagnosis was justified by the almost complete disappearance of the mental symptoms following an amelioration in the disease of the liver, and by the fact that a relapse of the mental condition occurred on the patient lapsing into a condition of grave icterus, in which he succumbed.

Joffroy calls attention to the fact that while mental symptoms dependent on disease of the liver have long been recognized, there have been none observed which so closely resembled general paresis.—*Gazette Médicale de Paris*, January 18, 1896.

## SURGERY.

UNDER THE CHARGE OF

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ASSISTED BY

|                                            |     |                                       |
|--------------------------------------------|-----|---------------------------------------|
| ALFRED C. WOOD, M.D.,                      | AND | C. L. LEONARD, M.D.,                  |
| INSTRUCTOR IN CLINICAL SURGERY, UNIVERSITY |     | ASSISTANT INSTRUCTOR IN CLINICAL SUR- |
| OF PENNSYLVANIA; ASSISTANT SURGEON,        |     | GERY IN THE UNIVERSITY OF             |
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### CRANIECTOMY, WITH THE AFTER-HISTORY OF TWO CASES.

T. TELFORD SMITH reviews the subject of craniectomy, and reports the after-history of two cases (*The Journal of Mental Science*, Jan. 1896).

The operation of craniectomy for microcephalus and idiocy has now been on its trial since 1890, and the cases operated on in France, in America, and in England number about 200, from which it ought to be possible to form some judgment as to the success of the operation, in so far as mental development is concerned.

The information which up to the present has been published as to the after-history of the majority of these cases is meagre in the extreme. We find in some cases "amelioration" or "improvement" reported, but particulars as to the kind and degree of improvement are not stated. Also in the published cases the space of time between the operation and the report is generally too short to admit of a well-founded opinion as to the results really due to craniectomy.

It seems time, however, to urge upon all who have had an opportunity of observing the after-results of the operation, in any cases in which a sufficient time has elapsed, to publish a full and impartial account of the present condition of the patients, and to contrast it with the condition before the operation.

The weight of evidence so far is, the author thinks, against the operation of craniectomy, as judged not only from the facts learned from an examination of microcephalic brains, microcephalic skulls, and of skulls in which the operation has been performed, but also as judged from the actual, mental, and physical results obtained in even those cases in which all the circumstances were favorable.

The first case described may be taken as a fair test-case as to the merits of the operation in microcephaly. He was in every way a favorable case to commence with, healthy and well-developed, with apparently nothing except the microcephaly to account for his mental deficiency. He has certainly had an ample amount of the bony brain-case removed in the five operations he has undergone; and since he has had every advantage and opportunity as regards special training and education. Yet nothing further can be attributed to the operations than the cessation of head-knocking, and though this is a distinct improvement in the boy's condition, yet it hardly seems an adequate result for the risk run. As to mental development, there is very little, and what there is would have most likely been attained by educational methods alone.

The second patient, although hardly falling into the class of microcephalic idiots, was a good test-case as to the advisability of the operation in congenital idiocy. It is impossible to see any mental improvement or sign of brain-development in this boy, and the author thinks in a similar case the operation would now rightly be considered unjustifiable.

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#### SHOULD THE APPENDIX BE REMOVED IN EVERY CASE OF APPENDICULAR ABSCESS?

J. WILLIAM WHITE, after referring to many interesting and important points concerning appendicitis that need further investigation (*University Medical Magazine*, March, 1896), alludes to others that he believed had been settled. Among the latter are the following indications which call for operation:

Immediate operation is indicated whenever the onset of a case of appendicitis is marked by both suddenness and severity; whenever, during even a mild attack, the symptoms at the end of forty-eight hours are unrelieved or are growing worse; whenever, in cases seen later, a firm, slowly forming, well-defined mass is to be felt in the right iliac fossa; whenever at any time a sudden increase in the acuteness of the pain and a rapid diffusion of tenderness occur; whenever there is good reason for believing the appendix-infection to be tubercular in character; whenever attacks of any type have been numerous, or are increasing in either number or gravity, or have unfitted the patient for work or activity, or have caused local symptoms which are permanent and persistent, or have at any time put the patient's life in great danger.

These are not considered exhaustive, but represent in general those that are undisputed.

In regard to the very important problem of the proper procedure in cases of appendicular abscess, the author quotes his views as expressed in a previous contribution on this subject (*AMERICAN JOURNAL OF THE MEDICAL SCIENCES*, January, 1894).

"If there is a circumscribed abscess, it is poor surgery to insist in every case and at every period upon finding and taking away the appendix in the face of all obstacles. In many cases of circumscribed abscess, and especially in those in which the appendix is bound down by adhesions in the depth of the wound, the surgeon should be content with evacuation, irrigation, drainage, and packing with iodoform-gauze. Persistent search for the appendix and attempts at its removal in these cases are attended with such danger of opening the peritoneal cavity that they are not to be recommended." His belief was, and is, that large numbers of cases demonstrate the truth of this proposition, that increasing experience shows to each operator that there are a not inconsiderable number of cases in which it is absolutely necessary to apply it, and that it should be placed among the facts regarding appendicitis which can be safely accepted by the profession.

Of thirty-seven cases in which the writer had operated and left the appendix there was not a single fatal result. A fecal fistula formed in two cases, and closed spontaneously and permanently in both. In but three has there been a recurrence, and in two of these the appendix was removed with the greatest ease; in the third it became obliterated.

In order to ascertain the practice of other surgeons who may be considered as among the foremost of American operators, White submitted his views, as quoted, to Drs. McBurney and Bull, of New York; Senn, of Chicago; Halsted, of Baltimore; and Richardson, of Boston; all of whom indorsed fully the position taken by the writer.

The article concludes as follows:

"It must be remembered that comparison is not to be made between such removal and purely medical or non-operative treatment.

"The comparison I desire to draw is between the routine method of insisting upon finding and taking out the appendix 'in all cases' and the really surgical plan of sacrificing non-essentials, in an operation, to avoid dangers threatening life; of profiting by the accumulated experience of one's co-workers; and of aiming, first, at the recovery of the patient, and only secondarily at the performance of a theoretically 'complete' operation.

"If the profession at large will weigh the evidence before it as to this important point in surgical practice, there can be no doubt as to the decision which will be reached. Probably no one of us who, in his own person, had any of the above-mentioned indications for operation would refuse it; it is certain that in such event he would prefer to have the appendix removed if it were possible to do so without adding to the risks of the case. These points are not under discussion. The question which every practitioner, and especially every operator, ought to ask himself is whether it is for the best interests of his patients that he should acquiesce in or try to live to a rule which, in the face of the foregoing evidence, as to the resulting increase in mortality, asserts the possibility and the propriety of removing the appendix *in all cases* of appendicitis."

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#### CASTRATION FOR PROSTATIC HYPERTROPHY IN SWEDEN.

DR. AXEL EUREN reports in the *Upsala Läkareförenings Förhandlingar* of December 23, 1895, six cases described before the Society, to which two have since been added.



The average age of the patients was seventy-three years; their average time in the hospital was twenty-eight days. All were relieved, although in four cases there had been complete retention for some days. In three of the patients removal of one testicle gave satisfactory results. In a fourth case the other testicle had to be removed before relief was afforded. Even in this case Dr. Euren thinks that if the testicle last removed had been taken alone at first the result would have been successful. Where patients are not over seventy years of age and urinary retention is not extreme, he thinks that the removal of a single testicle, selected if possible with due reference to the lobe of the prostate that most interferes with urination, may suffice. This he does under cocaine.

Digital examination by the rectum some time after operation showed in two cases atrophy and lessened consistency of the half of the prostate corresponding to the testis removed.

His cases show that there is notably greater retention of urine, however, when but one testicle is removed.

In all the cases decided relief was immediate—that is, within twenty four hours; the minimum of residual urine was reached usually in ten to fifteen days. In one case in which both testicles were removed for complete retention at sixty-five, potentia cœundi remained for over six months and then gradually disappeared.

In cases under observation for some time after the operation he has noticed no untoward physical or psychical results. Patients worn out in health and strength from urinary troubles regain their health, and, as in the analogous case of removal of the ovaries, improve noticeably in external appearance.

All of the patients were of the working-class, and were able, as a rule, to resume their occupations, that in most cases they had been compelled to give up entirely before operation. Euren thinks, and in support of his view quotes Esmarch, who holds a similar opinion, that in such cases a retention of the patient in the hospital for nearly a month should be made the rule, in order to secure proper involution of the prostate, before active exercise is allowed.

#### A NEW METHOD OF STERILIZING CATGUT.

SAUL (*Berlin. klin. Woch.*, Jan. 13, 1896) reported to the Berlin Surgical Society a new method for the sterilization of catgut, which he has discovered experimentally and proved to be efficient without destroying the strength or the absorbable quality of the catgut.

Beginning with the use of boiling alcohol as first employed by Répin in Pasteur's laboratory, he found that the most efficient result is obtained by combining with the alcohol carbolic acid and water in the following proportions, and thus lowering the boiling-point: Alcohol (æthyl alcohol), 85 parts; acid. carbol. liquefac., 5 parts; aqua destillata, 10 parts.

For the use of this solution an apparatus is necessary which maintains the liquid in its original concentration and proportion, and maintains its boiling-point at the same degree of temperature.

The author found that with this method five minutes were sufficient to destroy anthrax-spores, but for certainty recommends, in practice, boiling for fifteen minutes. The solution can be used over and over again, and the catgut is not injured by repeated boilings, and may be used immediately after sterilization.

## OTOLOGY.

UNDER THE CHARGE OF

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### CUTANEOUS NEOPLASTIC DIAPHRAGM IN THE EXTERNAL AUDITORY MEATUS.

McCONACHIE records the observation of a case of the above-named disease of the ear, with resultant deafness. Cutting away the cutaneous diaphragm was followed by an escape of mucus. Inspection revealed an entire destruction of the membrane, but the operation was followed by immediate restoration of the hearing in this ear.—*Journal of Eye, Ear, and Throat Diseases*, vol. i. No. 1.

### MALFORMATIONS OF THE AURICLE; OPERATIONS FOR RELIEF.

STETTER reports the surgical correction of congenital malformations of the auricle.—*Archiv f. Ohrenh.*, Bd. 39.

Judging from the illustrations accompanying the article referred to, we do not think the cosmetic results warranted the operation. As there was no evidence of the existence of an auditory canal or hearing in the ear operated upon, before the operation, no improvement in hearing could be expected from the operation.

BARKWELL and BIRKETT (*Med. News*, London, 1895) correct the deformity of prominent auricles by means of the removal of an elliptical piece of skin from the back of the ear. The diameters given are one and one-quarter by three-eighths inches.

### FOREIGN BODIES IN THE EAR.

BLAKE records the removal of a piece of gas-carbon from the drum-cavity of a boy of ten, where it had been forced by unskilful manipulations of local practitioners before seen by Blake. Notwithstanding the partial detachment of the auricle, the foreign substance had to be broken in two before it could be removed from the drum-cavity, where its ends were caught by the tympanic ring. Under antiseptic precautions a good recovery, with restoration of hearing, resulted.—*Transactions of the American Otological Society*, vol. vi. part ii.

ADAMS reports the case of a little girl of three who fell with a skewer-like piece of wood in her mouth, and forced the inner end of the stick into the soft parts to the outer side of the anterior pillar of the palate between the latter and the inner side of the ramus of the lower jaw, where it broke off.

The point, one-half inch long by three-sixteenths of an inch thick, penetrated the floor of the osseous auditory canal, and was finally removed by forceps through the external auditory meatus. The ear was not injured, but the lower jaw remained restricted in motion as late as a year after the accident.—*Transactions of the American Otological Society*, vol. vi. part ii.

The danger of tetanus in such a case was alluded to by Adams and by Fryer, in the discussion following the report of the case, the latter quoting from a French source a case of tetanus resulting from getting a pebble in the ear, and the manipulations connected with getting it out. We saw some months ago a case of fatal tetanus in a boy of twelve, in which instance the only possible explanation of the origin of the disease was from *careless (septic) domestic syringing of a chronic purulent otitis media*.

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#### EXOSTOSIS OF THE AUDITORY CANAL.

MATHEWSON reports the removal of an exostosis from an ear in 1893, from which he had removed a similar growth in 1876. There was no reappearance, however, as late as 1885. The removal of the exostosis the last time was accomplished with dentists' "maxillary antrum-drills," instead of with "square drills," as the first time. The hearing was again restored.—*Transactions of the American Otological Society*, vol. vi. part ii.

POLITZER reports the post-mortem examination of an exostosis in the auditory canal of a man of sixty-four. The growth was supposed to have originated from a previous chronic otorrhœa and the osseous anomalies in the auditory canal and partly those in the mastoid cells (total eburnation) to have been due to retention of epidermic masses. The perforation in the membrana tympani, as well as the perforation in the osseous boundary of the antrum, favored the passage of epidermic masses from the middle-ear to the external auditory canal. Politzer thought that an early destruction of the bony growth would have prevented the formation of the above-named anomalies in the bone.—*Austrian Otological Society; Annales des Mal. de l'Oreille*, vol. xxi. No. 8.

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#### ACUTE INFLAMMATION OF THE TYMPANIC ATTIC.

TANSLEY (*Transactions of the American Otological Society*, vol. vi. part ii.) has found prompt incision through the flaccid membrane into the attic of the tympanum in acute inflammation of the latter space of great advantage, as recommended years ago by Sexton and Buck. Tansley adds the very wholesome advice *to close at once, after paracentesis, the external auditory meatus with absorbent cotton, and refrain from douching and syringing*.

We prefer iodoform or carbolic-acid gauze as a stopper for the meatus in such cases, and always refrain not only from syringing and douching the ear, but also from inflations of the tympana, as they are all means of septic secondary infection of the inflamed drum-cavity.

We hope the time is near at hand when it will be generally recognized that the time to syringe an acutely inflamed ear is *before the discharge sets in, and not afterward*, since this acute discharge is beneficent and can be safely favored only by the insertion of a slender drainage-strip of antiseptic gauze in the meatus, or even by a loosely applied stopper of gauze in the concha of the auricle.

As between the old way of letting the acutely inflamed and running ear alone and the present fashion of over-treatment of such an ear, preference must be given to the former, as less likely to irritate and thus lead to secondary, serious results.



## OBSTETRICS.

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 UNDER THE CHARGE OF

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## CARDIAC AFFECTIONS COMPLICATING PREGNANCY AND LABOR.

DEMLIN (*L'Obstétrique*, 1896, No. 1) estimates the frequency of cardiac disorders in pregnant women as 1 in  $\frac{2}{100}$  per cent. He draws attention to the importance of auscultating the maternal heart in these cases. The great majority of these patients—70 per cent.—suffered from heart-lesions during first pregnancy. A considerable number were affected with dyspnœa and hemorrhage of various organs of the body during pregnancy. The majority of them went to term, and were delivered of living children.

In treating these patients during labor each case demands study from its individual peculiarities. In the event of sudden death post-mortem Cæsarean section should be at once performed. A patient's ability to pass through labor successfully will depend upon the integrity of the heart-muscle and the condition of the liver and kidneys. Where these organs are profoundly affected, pregnancy must be interrupted; where, however, no immediate danger threatens the patient, she should be treated by appropriate medication and diet, especial attention being paid to the condition of the blood, and pregnancy should not be interrupted unless absolutely required.

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## A NEW METHOD OF LIGATING THE UMBILICAL CORD.

BUDIN (*L'Obstétrique*, 1896, No. 1) has devised a new method of ligating the umbilical cord with strong linen thread, as follows: The cord is first tied by encircling it with the ligature, and tying firmly in a surgeon's knot; one portion of the ligature is then passed half-round the cord, and the two strands are again tied perpendicularly to the first, the knot being brought down upon the cut end of the cord about at its middle. This results in the separate ligature of one-half of the cord containing the umbilical vein, and one of the arteries. The ligature is then passed in a similar way about the other umbilical vessel, and the knot again cut in the middle of the cut end.

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THE TREATMENT OF COMPLICATIONS IN LABOR OCCASIONED BY  
VAGINAL FIXATION OF THE UTERUS.

In the *Centralblatt für Gynäkologie*, 1896, No. 6, RÜHL describes two cases in which labor was complicated by previous operation upon the uterus. The first was a multigravida who had usually had easy labors. She suffered from retroflexion and adherent uterus. Other methods of treatment failing, she was operated upon. Pregnancy occurred nine months afterward, and was

characterized by difficulty in emptying the bladder. When labor came on, although pains were good, progress was not made. When the patient was seen the uterine wall was greatly stretched, and the child had been dead for twenty-four hours. The head had entered the pelvis, and was contained in a diverticulum of the uterine wall so firmly that it could not be moved without an anæsthetic. The os uteri was drawn up so far that it was very difficult to reach the os. The broad ligaments could be very plainly felt. Under deep anæsthesia it was possible to dislodge the head and push it up. The os uteri would admit four fingers only, and efforts at further dilatation were not successful. The mouth of the uterus was dilated by the hand, and with considerable difficulty version was performed. It was then determined to perforate the child, and this was done with difficulty. The extraction of the child was exceedingly hard, because of the thickened uterine tissue, which formed a sort of girdle so strong that it was necessary to incise it with a tenotome to permit delivery. But little hemorrhage followed the incisions, and delivery was accomplished, although with great difficulty. The uterus was finally emptied, the patient making a good recovery.

His second case was that of a woman who had had two children, but who suffered from subinvolution, which was first treated by curetting and then by fastening the womb to the wall of the vagina. During her pregnancy she suffered from difficulty in emptying the bladder. When labor came on the cord prolapsed as soon as the membranes ruptured, followed by strong labor-pains. Upon examination the mouth of the uterus was found very high up; it was impossible either to replace the cord or to make version. To effect delivery it was necessary to make an incision 8 cm. long. No especial hemorrhage followed. The incision was also extended laterally, and the tissues united with catgut. It was then possible to extract the child with forceps. The placenta was removed and the incision closed by suture. The patient made a good recovery and the uterus was found in normal position.

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#### ETHER AND CHLOROFORM IN NORMAL LABOR.

In the *Monatsschrift für Geburtshülfe und Gynäkologie*, 1896, Band 3, Heft 3, BUKOEMSKY, of St. Petersburg, describes his experiments with ether and chloroform during normal labor, from which he arrives at the following conclusions: He finds that ether lessens the suffering of uterine contractions, and that at the moment of birth it can make gestation painless. Ether does not at all prolong labor; but, on the contrary, in primiparæ, it lessens the average duration of labor fifty-four minutes. It increases the efficiency of uterine contractions, the length of the pains not being shortened, while the pauses between the pains are shorter. But little irritation was experienced during the inhalation of ether, and its odor was not especially objectionable. The puerperal period was not influenced unfavorably by the use of ether during labor, the serous lochia appearing earlier with women who had ether during labor than with those who had none. With multiparæ, however, this period was somewhat lengthened. Hemorrhage was not observed after the use of ether. Involution proceeded well; no case of disease of the respiratory organs was observed in those who took ether. The pulse, temperature, and respiration were uninfluenced by ether. The distention of the breasts

was less after ether, and in some cases the formation of milk was delayed twenty-four hours. In general, however, ether had no unfavorable influence upon lactation. When used to produce surgical anaesthesia ether did not influence the fetus unfavorably. When the mother is anaesthetized the fetus is in a similar condition, but it soon passes off without any further effect. It is observed that children whose mothers inhale ether during labor have jaundice less often than in cases in which it is not employed.

The most favorable time for the use of ether is when the os uteri admits three fingers; this is at the beginning of the period of actual dilatation when the patient's suffering is often very great. It is not observed that ether has any direct influence upon the dilatation of the uterus.

Similar experiments with chloroform showed that when small quantities are given it does not diminish the activity of the muscles engaged in labor; but, on the contrary, that the duration of the pains was less, while their efficiency was increased. The vapor of chloroform is much less irritating, while in small quantities it does not delay labor. It did not predispose to hemorrhage, nor to retention of the placenta. It had no unfavorable influence upon the children. In many cases a very faint jaundice developed.

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#### TAMPONING THE CERVIX TO CHECK NAUSEA AND VOMITING OF PREGNANCY.

KEHRER, of Heidelberg, reports in the *Centralblatt für Gynäkologie*, 1896, No. 15, the case of a young woman, aged twenty-one years, of very hysterical temperament, who had had a number of illnesses before she became pregnant. An exudate was found at one time in the vicinity of the ovary upon the right side. The patient not long after marriage had an abortion at four months. During this brief pregnancy she had been greatly troubled with nausea and vomiting, which were not relieved by narcotics. She soon after became pregnant again, and at once began to suffer severely from nausea. After various remedies had been tried, including the application of solution of nitrate of silver, an effort was made to end the nausea by partially dilating the cervix with the finger. While very brief improvement followed, no permanent cure resulted. The patient's condition became so serious through weakness, loss of flesh, and failing strength that it was determined to empty the uterus. With a view of bringing on labor-pains, Kehrер tamponed the os and cervix with strips of sterile gauze soaked in glycerin. The nausea immediately stopped, and a period of several days, in which the patient was free entirely, followed the use of the tampon. After a short time the symptoms reappeared, when the tampon was again employed with a similarly successful result. Kehrер was able by this method to carry the patient along in pregnancy until the thirty-third week, when labor was induced and she was delivered of a living child. The infant was at first partially asphyxiated, but speedily revived, and became normal in strength and weight.

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#### THE VALUE OF CREDÉ'S METHOD FOR PREVENTING OPHTHALMIA NEONATORUM.

In the *Archiv für Gynäkologie*, 1895, Band 50, Heft 2, KOSTLIN contributes an extensive paper upon this subject, in which he quotes the results obtained



by various obstetricians who have employed Credé's method for the prevention of ophthalmia. He concludes from his study of the subject that statistics show that in the very beginning of ophthalmia it is almost impossible to distinguish it from a simple catarrhal conjunctivitis. The superiority of Credé's method over the use of vaginal douches is made evident by the reports of cases. Some patients are seen in whom the eyes of the fœtus became infected during the very process of labor. The late appearance of the disease, sometimes known as secondary infection, is thought to be a primary infection with a long stage of incubation. It is possible for a genuine secondary infection to occur, although it rarely happens. No unfavorable results are reported from the use of Credé's method, and affections of the cornea, which has been protected, have not been seen, nor have the symptoms of great irritation developed which have been feared by those employing the method. The eyes of the children so treated are not more sensitive to a later infection. The feasibility of the method in the hands of midwives and physicians especially recommends it. The question of making the use of nitrate of silver obligatory is a difficult one to solve. This is scarcely possible without seriously infringing upon the rights of someone. Any effort to make a method of treatment binding upon all must in some degree interfere with personal rights. The most that can be done in the matter of regulation is to insist that midwives shall at once report to a physician any case of purulent conjunctivitis which they may see.

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TWIN PREGNANCY IN WHICH ONE CHILD WAS CARRIED TO TERM,  
DESPITE THE DEATH OF THE OTHER AT FOUR MONTHS.

PUJOL, in the *Archives de Gynécologie et de Tocologie*, 1896, No. 3, reports the case of a patient, aged twenty-four years, who was admitted to the hospital in the pregnant condition. On examination it was found that the membranes had ruptured, and that the patient was probably pregnant with a very large child, or with twins. Dilatation of the cervix proceeded until it was possible for the attending physician to make a thorough examination, when the knees of a small child were found presenting, and the fœtus was readily extracted. The second child had the usual presentation, and was born without special difficulty. It was found that one child had perished some time previously, and that its head had been greatly pressed upon by the second, larger, and living child. The second twin had survived the death of the other without especial injury.

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AN APPLICATION OF THE RÖNTGEN RAYS TO INTRAUTERINE  
PHOTOGRAPHY.

In the *Annales de Gynécologie*, March, 1896, VARNIER and his associates publish a Röntgen ray picture of a uterus at three and one-half months, which had been taken from the body of a woman dying of pernicious anæmia. The picture gives an indistinct outline of the fœtus, which appears much darker than the surrounding contents of the uterus. Dissection of the specimen confirmed the diagnosis made from the picture.

The writer's experiments with the Röntgen rays upon pregnant women, made during the month of February, 1896, showed that it is perfectly pos-

sible to obtain an outline of the living fœtus in the body of the mother. The difficulties to be surmounted are the thickness of the tissues and the distance at which the Crookes's tube is necessarily placed from the fœtus itself. Anatomical specimens of uteri and their contents, removed from the body, should occasion no difficulty whatever. By varying the electric force employed and the time of exposure it is undoubtedly possible to obtain a useful picture of the contents of the living womb.

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## GYNECOLOGY.

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UNDER THE CHARGE OF

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### THE INFLUENCE OF CASTRATION ON STRUCTURAL CHANGES OF THE UTERUS.

SOKOLOFF (*Archiv für Gynäkologie*, Band li., Heft 2) presents the results of a series of interesting experiments upon bitches and rabbits, undertaken with the view of determining the anatomical changes which take place in the uterus after the removal of one and of both ovaries. After the former operation the heat returned as before, but in no instance after the removal of both ovaries. The animals were killed at different periods after the operation, varying from twenty days to fourteen months, their uteri were removed, hardened, and sections were made. No variations from the normal were noted in cases in which a single ovary had been removed, but after complete castration a well-marked atrophy of the circular muscular layer was observed, which reached its height four months after operation, as well as a disappearance of numerous muscular fibres in the longitudinal layer. The caliber of the vessels was diminished and their walls were thickened, especially in uteri removed several months after castration. The endometrium remained unchanged even a year or more after the operation.

The writer denies that the atrophy of the uterus following castration is due to ligation of the spermatic arteries, since the collateral circulation is speedily restored. It must, then, be attributed to a disturbance of nutrition in the uterine tissue secondary to extirpation of the ovaries, of nervous origin, either central or dependent upon the removal of vasomotor or trophic centres in the ovaries themselves. The writer favors the latter theory. Every tissue must, in order to retain its normal structure, perform its normal functions, as well as receive a proper amount of nourishment. When the normal physiological stimulus of this tissue is absent and its function is accordingly suspended, it undergoes atrophy, even though its nutrition is not disturbed. The regular rhythmical contractions of the uterus cease after extirpation of the ovaries which are the seat of the exciting impulses; its normal functions, menstruation and pregnancy, are eliminated, and muscular atrophy results. The endometrium, not being influenced by

these contractions, remains unchanged. The latter phenomenon may be explained on the theory that the mucosa and utricular glands are presided over by a special nerve-centre independent of the atrophic centre regulating the muscular tissue.

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#### SYMPATHETIC GANGLION IN THE OVARY.

HERFF (*Ibid.*) examines the evidence presented by several observers, notably by Elizabeth Winterhalter, in favor of the theory that the human ovary possesses an independent ganglionic system presided over by a central ganglion, and arrives at the conclusion that the presence of ganglion-cells has not yet been demonstrated in a satisfactory manner, though their existence, at least in the hilum, seems highly probable. However, he denies positively that a true ganglion exists in the ovary.

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#### GENITAL TUBERCULOSIS IN CHILDREN.

MAAS (*Ibid.*) calls attention to the rare occurrence of genital tuberculosis in children in comparison with its frequent appearance in other regions. In a careful search through the literature he was able to find only seven cases, to which he adds an eighth. In the autopsy upon a girl five years old, who died of general tuberculosis, he found tubercular ulceration of the mucosa of the uterus and tubes. The muscular wall of the latter was filled with tubercular nodules, but that of the uterus was not affected. The ovaries were normal. There seemed to be no doubt that the internal genitals were the original seat of the trouble. The cause of the infection was most obscure. It seemed improbable that bacilli could enter the vagina, as the hymen was intact and the ordinary causes (coitus, unclean instruments, etc.) could be positively excluded. Moreover, the vagina was healthy. The presence of a line of old fibrous tubercles along adhesions extending inward from the umbilicus to the parietal peritoneum led the writer to infer that the infection entered through the navel, a fact of considerable interest to the obstetrician.

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#### CRITICISM OF VAGINO-FIXATION.

LEOPOLD (*Centralblatt für Gynäkologie*, 1896, No. 6) states that he has always been opposed to the operation, since it substitutes for the retroflexion a position of the uterus which is no better than the former. The relations of the uterus to the bladder are entirely abnormal, the portio is fixed in an unnatural position, and unless Douglas's pouch is first opened and adhesions are thoroughly separated, it is useless. Moreover, recent reports concerning the serious complications arising in cases of pregnancy in vagino-fixed uteri furnish a powerful argument against the operation.

The writer has been perfectly satisfied with the ultimate results of ventro-fixation, especially during pregnancy and labor. Most of the bad results reported have been due to the fact that either the uterus was fixed in an improper position (especially too high up), or that non-absorbable sutures were used. He employs a single suture on each side, introduced inside of the insertion of the tube, and fixes the uterus not more than half an inch above



the upper border of the symphysis. Although not always successful in his hands, he thinks well of Alexander's operation. He adds the caution that greater care should be exercised in deciding whether operative treatment is indicated in an individual case of retroflexion, since the association of various local and general symptoms with retrodisplacement is by no means a proof that the former are directly due to the latter.

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#### CONSERVATIVE SURGERY OF THE TUBE.

GERSUNG (*Centralblatt für Gynäkologie*, 1896, No. 2) describes a conservative operation for hydrosalpinx after extirpation of the opposite tube and ovary, the corresponding ovary being normal. The sac was incised, its contents evacuated, and the ovary sutured in the opening with fine silk, so that only a portion of its upper surface remained visible. It seemed to be fairly certain that during ovulation the ova would escape into the tube, but, not having a probe, the operator was unable to satisfy himself that the proximal end of the tube was patent, so that conception might occur.

The patient was discharged at the end of three weeks; she menstruated a month later, and became pregnant after the second period. When examined pregnancy had advanced to four months, and she was in excellent health.

The operation proved conclusively that a hydrosalpinx can, by conservative treatment, be transformed into a tube capable of performing its normal functions, and that the usefulness of a healthy ovary is not impaired by transplanting it into the wall of the sac.

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#### FERRIPYRIN AS A HÆMOSTATIC IN GYNECOLOGY.

In a supplementary report on this drug SCHAEFFER (*Ibid.*) calls attention to its superiority to the chloride of iron in the following conditions: 1. As a simple hæmostatic in all cases of hemorrhage from the genital tract in which a caustic action is not sought for; *i. e.*, in menorrhagia and metrorrhagia of whatsoever origin, as well as in parenchymatous hemorrhage during operations in which it is impossible to suture the bleeding surfaces. 2. As a styptic application after curettage, in a watery solution of 16 to 18 per cent. 3. In a 1 or 2 per cent. solution for irrigation of the uterus and vagina in cases of endometritis, erosion of the cervix, and colpitis, especially gonorrhœal. 4. Applied in the form of powder in inoperable carcinoma of the cervix it not only checks the hemorrhage and foul discharge, but has a distinct analgesic effect. 5. In hæmaturia it may be injected directly into the bladder in a strength of from 1 to 16 per cent., with great relief to the tenesmus.

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#### PSEUDO-MYXOMA OF THE PERITONEUM.

RUEDER (*Ibid.*) reports three cases of this affection, the symptoms being dull, aching pain in the abdomen, which gradually became enlarged; loss of appetite, gastric disturbance, and later dyspnoea. There were no symptoms of rupture, so that it is probable that the gelatinous material escapes gradually from the multilocular cysts, or rather grows through their walls.

Although operative interference is indicated, no instances of cure in advanced cases have been reported. It seems as if the absorptive power of the peritoneum had been too seriously impaired.

## PÆDIATRICS.

UNDER THE CHARGE OF

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ASSISTED BY

THOMPSON S. WESTCOTT, M.D.,  
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## THE TREATMENT OF BRONCHO-PNEUMONIA.

In a valuable clinical lecture upon the prognosis and treatment of acute broncho-pneumonia in children LE GENDRE (*Le Semaine Médicale*, March 4, 1896, p. 89) describes at length the various means by which hydrotherapeutic treatment may be applied in this disease. The cold chest-pack should be applied every quarter of an hour at first, and then at longer intervals as satisfactory effects are obtained. If these fail after a few applications, the wet pack is to be tried; and in event of its failure recourse must be had to the tepid or cold bath. D'Espine and Picot advise that the first bath should have a temperature of 90° to 95° F., the subsequent ones 86° F., and the duration from five to fifteen minutes, and the number of baths from one to three in the twenty-four hours. In the intervals of the baths the cold compresses may be continued, at least upon the chest and abdomen, if the fever is not reduced after the bath. Hénoc'h recommends, according to the gravity of the case, either the warm bath, followed by wrapping in wool for several hours, which produces abundant sweating, or the tepid bath with cold affusions once or twice daily. Rilliet, Barthez, and Saané also advise the tepid bath in the acute forms with very severe nervous symptoms. Baginsky, who is a strong advocate of the cold pack to the chest, approves of the cold affusions in the tepid bath only in threatening asphyxia, and then counsels caution for fear of collapse, always giving a stimulant beforehand. Notta employs the tepid bath at 77° to 86° F., following by cool lotions or even the cold baths.

According to Hutinel, the most striking effects of the cold bath are the increase in the urinary secretion, in the saliva, and in the digestive fluids, rendering the tongue moist and promoting appetite and digestion. The typical indication for the cold bath is the coexistence of very marked general symptoms (hyperpyrexia, dyspnoea, agitation), with local lesions of moderate extent. When the lung is extensively hepatized without strong febrile reaction the cold bath does not give good results, and perhaps even favors collapse. Bad action of the heart is also a contraindication. Hutinel is inclined to think that the cold bath succeeds better in the broncho-pneumonias due to the pneumococcus, whose course is more frank, than in those due to the streptococcus, which are slower in course and of longer duration. When the temperature reaches 105 $\frac{1}{2}$ ° the cold bath is always indicated. The temperature of the first bath should be 82°, and should last from five to ten minutes. The following baths may be from 75° to 65°, but never lower.

Le Gendre, in his own practice, begins with a temperature  $3\frac{3}{5}^{\circ}$  below that of the child. This first bath is very short (five minutes). An hour later a bath at  $95^{\circ}$  F. is given for ten minutes; and two hours later another at  $90^{\circ}$  for fifteen minutes. The following baths at three-hour intervals are given at  $86^{\circ}$ , or even at  $77^{\circ}$ , when the pyrexia yields but temporarily.

An important duty lies in frequent washing of the mouth, throat, and nasal fossæ with boric acid solution and Vichy water, so as to maintain appetite and preserve taste and smell. The author believes that the broncho-pneumonia of children is better treated by hydrotherapy, alcohol, hypodermatic injections of caffeine, and careful hygienic precautions than by any of the older methods of treatment.

#### THE ACUTE RETROPHARYNGEAL ABSCESS OF INFANCY AND CHILDHOOD.

A very valuable paper on this subject has just appeared from the pen of HENRY KOPLIK (*New York Medical Journal*, April 4, 1896, p. 440), based upon an experience of seventy-seven cases.

The retropharyngeal space in infants and children is not so large comparatively as in adults, and the larynx is fully one vertebra higher; the space which is most concerned in the retropharyngeal abscess is, therefore, encroached upon in infants, and symptoms of pressure upon the larynx occur sooner than in adults under similar conditions. The point of origin of such abscesses is in one or more of the lymph-nodes of the retropharynx, which are intimately connected with the system of lymph-vessels of the tonsils and of the soft tissues of the palate, which are in turn connected with the deep facial and the deep cervical glands. All processes which are in play in these organs, such as simple angina, diphtheria, or the infections of scarlatina or measles, and other lesions of the mucosæ of the mouth, are apt to draw into sympathy these retropharyngeal glands. Sometimes several of these nodes are affected, and then the retropharyngeal swelling can be both felt and seen from the inside of the mouth, and can also be recognized by a palpable swelling on the side of the neck beneath the angle of the jaw in front of the sterno-mastoid or behind the border of this muscle.

The author divides such abscesses into three distinct classes: 1, the acute abscess, pointing either wholly internally or internally and externally, or forming chiefly an external tumor; 2, the chronic tuberculous abscess; and, 3, the septic abscess. The latter class includes those burrowing abscesses which result from infection after or with the exanthemata (scarlatina), and which burst into and involve the mediastinal tissues or important structures in the neck, and may cause death.

Referring exclusively to the acute non-septic abscess, the author has succeeded in isolating four distinct species of streptococci, which were the only micro-organisms present in the pus; these he divides into two classes: the *streptococcus brevis pharyngis* (a and b), and the *streptococcus longus pharyngis* (a and b). Animal-experiments with both streptococci varieties showed that they produced no effects similar to what are seen in experiments with streptococci taken from virulent pus. In no case was tuberculosis produced from the injection of any of the pus in the pure crude state, thus showing that the contention of some observers that the acute retropharyngeal abscess in many



cases is tuberculous is unfounded. Apart from those cases which complicate infantile sepsis or scarlet fever, he concludes that the abscess is a benign disease, and its tendency, when aided artificially by treatment, is toward rapid recovery.

As regards age, the study of these seventy-seven cases shows that the acute retropharyngeal abscess is pre-eminently a disease of infancy. Four were aged one to three months, ten aged three to six months, forty-one aged six to twelve months, ten aged a year to a year and a half, and the remaining twelve from a year and a half to nine years.

Diagnosis is not difficult, provided the classical symptoms which have already been described by Henoch and Bokai are confirmed by inspection and careful digital palpation. Gentleness in manipulation is imperative, for if rupture occur under the pressure, the pus is apt to flow into the larynx. In cases in which the author has been obliged to withhold the knife he has found that the abscess bursts and discharges very gradually by minute openings, and in no case has he known an infant to be suffocated during this natural method of cure. In exceptional cases, as in one recorded by Bokai, death has resulted from bursting of the abscess during sleep; but, while by no means advocating non-interference, the author thinks that the danger has been exaggerated.

Prognosis of the uncomplicated abscess, if treated by timely interference, is exceedingly good, Bokai senior having recorded only 6 deaths in 179 patients, and Bokai junior only 8 in 138. Apart from laryngeal spasm and inspiration-pneumonia a certain unnamed percentage of deaths must be accredited to "reflex syncope," a condition which is capable, perhaps, of more satisfactory explanation. In his own series of cases he has had no deaths from spontaneous rupture or subsequent pneumonia.

In treatment the author advocates internal incision with a guarded bistoury, the method being almost identical with that adopted independently by Bokai. Fluctuation should be demonstrable before incision. After incision he deprecates pressure upon the walls of the abscess with the finger, since symptoms of collapse may supervene. If necessary, pressure can more effectually be exerted externally from the side of the neck. After operation the baby should be put at the breast, as suction seems to favor drainage. If after the primary incision the breathing and voice do not immediately improve, a search should be made for other collections of pus. Burkhardt's operation by external incision, the author thinks, should be reserved for cases in which the external swelling is most marked and for tuberculous abscesses, with which in this large series of cases he has never had to deal.

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#### THE USE OF THE ANTISTREPTOCOCCIC SERUM OF MARMOREK IN SCARLATINA.

JOSIAS (*Tribune Médical*, September, 1895) has made some therapeutic tests of antistreptococcic serum in scarlet fever. While the pathogenic germ of scarlatina is not definitely known, it is certain that the streptococcus is encountered in all cases of the disease whether simple or complicated. It seemed rational to the author to seek to prevent secondary infection and toxic effects by injecting a small quantity of antistreptococcic serum. This was

obtained from the sheep by Nocard, and both he and Josias inoculated themselves with a dose of 20 c.c. before beginning the experiments with the patients. No phenomena but a slight urticaria occurred after several days. By injecting a minimum dose of 5 c.c. of the serum the author hoped to prevent all complications of the disease. About fifty cases were subjected to the treatment, and the injection was made in the right iliac region, with the usual antiseptic precautions. Pain was not complained of and no local accidents occurred. The only reaction noted was an eruption of urticaria, which occurred in a number of the cases, but was localized often in the region of inoculation, though occasionally becoming generalized; its duration varied from several hours to two days. None of the cases died, but the course of the disease seemed in no way modified, and implication of the cervical glands and of the kidneys was not prevented. The author raises the question whether the use of a horse-serum and an increase of the dose may not produce more favorable results.

#### BROMOFORM IN PERTUSSIS.

MARFAN (*Revue Mensuelle des Maladies de l'Enfance*, April, 1896, p. 177) contributes favorable testimony for this newest of the specifics in whooping-cough, from an experience of forty cases. He believes it to be superior to antipyrine or belladonna. The formula that he employs is as follows: Bromoform, 48 drops; oil of sweet almonds, 20 grammes; gum adragante, 2 grammes; gum arabic, 4 grammes; cherry-laurel water, 4 grammes; and water to make 120 c.c. Mix first the bromoform and oil and shake vigorously; then add the other ingredients. A coffee-spoonful contains two drops of bromoform. For a child five years of age he prescribes as a daily dose four drops for each year of the age; from five to ten years the beginning dose is twenty drops daily. These doses should be gradually increased two to four drops a day until they are doubled. Under six months the initial daily dose should be two to three drops; from six months to one year, from three to four drops. In all cases the daily dose should be given in three portions. While the results of this treatment are exceedingly satisfactory, the author has failed to observe shortening of the duration of the paroxysmal period, contrary to the experience of Stepp.

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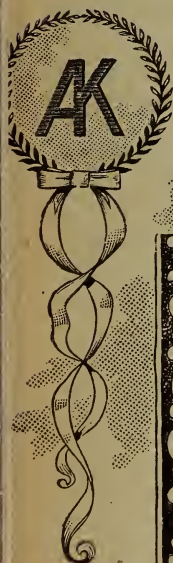
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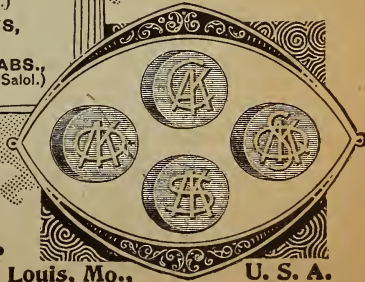
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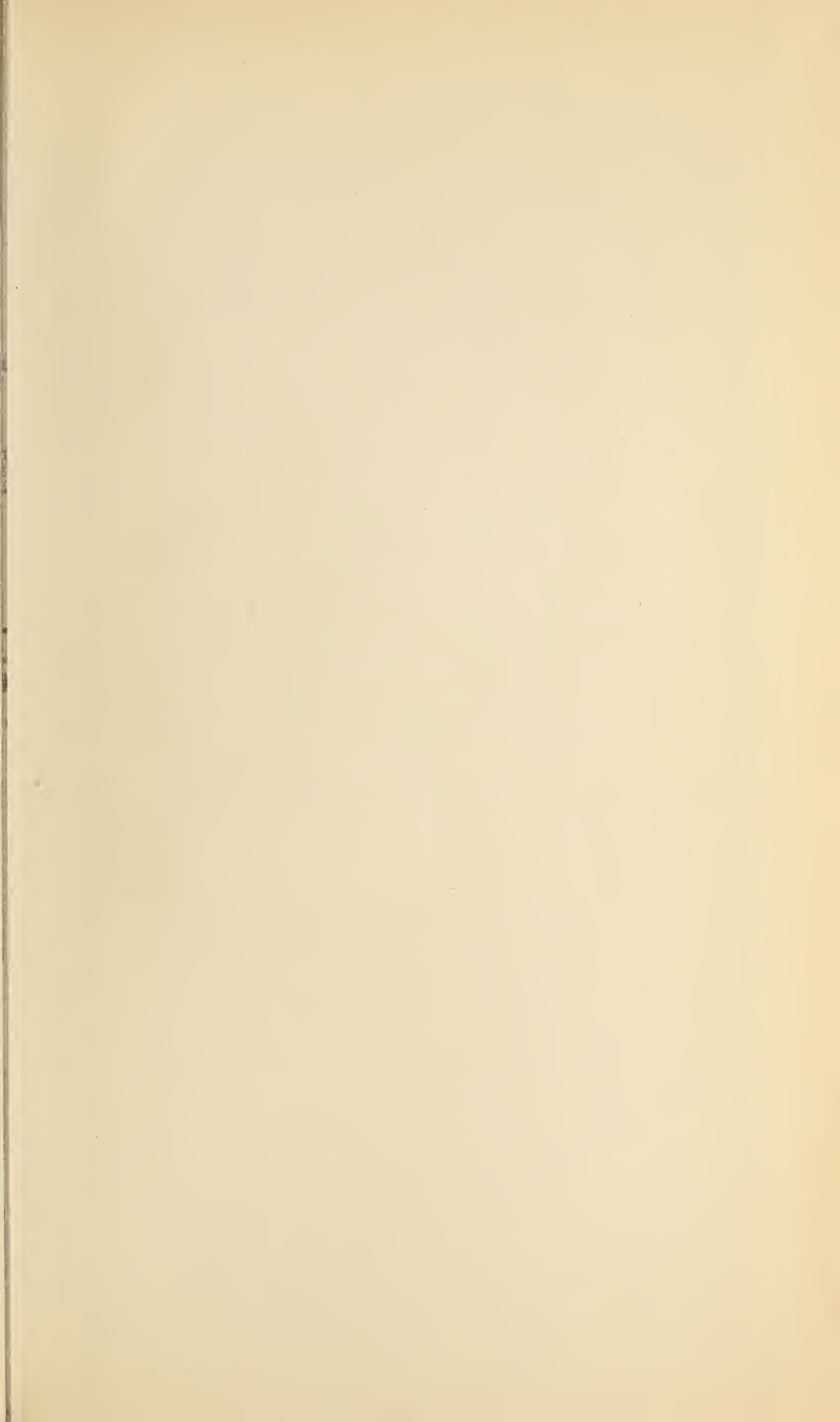
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